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Usamah Al-farhan

A Detailed Decomposition of Changes in Wage Inequality in Reunified Post-Transition Germany 1999-2006

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A Detailed Decomposition of Changes in Wage Inequality in Reunified Post-Transition Germany 1999-2006; Accounting for Sample Selection

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ABSTRACT:

In this article, I analyze the changes in wage inequality in the eastern region, western region and reunified Germany a decade after reunification. For that purpose, I use data from the German Socio-Economic Panel for the period 1999 – 2006, and implement the decomposition methodologies of Fields (2003) and Yun (2006). I find that during the sub-period 1999-2002 each of the characteristics effect, coefficient effect and residual effect contributed to the increasing levels of wage inequality in Germany. On the other hand, the relative stability in wage inequality during the sub-period 2002-2006 was caused by the fact that the characteristics effect and the residual effect influenced wage inequality negatively, whereas the coefficient effect maintained a positive influence in both the western region, eastern region and in reunified Germany alike. Hence, I conclude that after 1999, changes in wage inequality in Germany can be explained by both; changes in workers characteristics and changes in the wage structure, and not by changes in the wage structure alone, as the case has been during the transition process in the first decade after reunification.

JEL Classification: D30, J31

Keywords: Wages, Inequality, Decomposition, Transition, Characteristics effect, Coefficient effect, Residual effect, Selection bias, Maximum Likelihood

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INTRODUCTION:

On October 3rd, 1990 the former Federal Republic of Germany (FRG) and the German Democratic Republic (GDR) reunified[1] into the officially called Federal Republic of Germany (Bundesrepublik Deutschland) of today. Western political, legal and financial institutions, accompanied with a considerable amount of capital and subsidies were directly transferred to the east. This has clearly marked the difference between the transition process of the east to western political and economic norms, from other transitional systems that where not directly guided and assisted by a bigger sister.

As a natural consequence of the transition, the wage level and inequality have increased considerably in the eastern region due to changes in, among other things, the wage structure. Several articles indicate that most of the increases in the level and inequality of wages happened during the first five years of the transition (see Biewen (2001), Yun (1999), Gang and Yun (2003) and Gang e al. (2006)).

As will be shown later in this article, it was not until 1999 that inequality in the east has reached the levels in the west. Furthermore, from 1999 to 2002 wage inequality increased by 32.80% in the western region and by 38.41% in the east. This translated into a 29.11% increase in wage inequality in reunified Germany. During 2002-2006 however, wage inequality stabilized in both regions; decreasing by 3.03% in the west and increasing in the east by 7.14%. That translated into a negligible decrease in wage inequality in reunified Germany by 0.60%. Therefore, this article is driven by the motivation and curiosity to disentangle the causes behind the aforementioned increasing trend of wage inequality in Germany during 1999-2002, and then the relatively stable trend during 2002-2006.

In Particular, I will investigate the gross relative shares of the main socio-economic variables that explain the increasing wage inequality in the first period and explore what happened to those shares in the period that followed, for wage inequality to stabilize. I will decompose the changes in those gross relative shares into changes that are due to

[1] The term "reunification" is used to distinguish this unification from the unification of Germany that took place in 1871, which preceded the post WWI Weimar Republic.

changes in workers' labor market characteristics, changes that are due to changes in the returns to those characteristics and changes that are due to changes in the residuals.

For that cause, I use data from the German Socio-Economic Panel for the period 1999-2006 and employ the decomposition methodologies introduced first, by Fields (2003), and second by Yun (2006), in which he synthesizes the two earlier developed decomposition methodologies of Juhn, Murphy and Pierce (1993), hereafter JMP, and Fields (2003).

The advantage of the Yun (2006) decomposition over the JMP (1993) and Fields (2003) methodologies can be summarized by the following. The JMP method shows that differences in earnings inequality can be decomposed into an observable characteristics effect, coefficient effect and a residual effect, but does not allow for the assessment of the relative contribution of each individual factor (e.g. education, experience …etc.) to changes in earnings inequality. The Fields (2003) decomposition methodology on the other hand, allows for the assessment of the gross relative contribution of each individual factor to earnings inequality, while falls short in further decomposing the gross effect into characteristics and coefficient effects. Hence neither can the JMP nor the Fields methodology answer interesting questions such as; how much do changes in returns to education and/or potential experience contribute to changes in earnings inequality? Or, how much do changes in returns to gender and/or being native contribute to changes in earnings inequality? Here is where the Yun (2006) methodology comes in handy, since it can be implemented with relative ease, to provide clear answers to questions of this kind.

This article proceeds by reviewing a representative sample of the relevant literature in section I, presenting the data and the descriptive statistics in section II, explaining the applied methodologies in section III and discussing the empirical results in section IV. Section V concludes.

I. LITERATURE REVIEW:

The methodologies implemented in this article are those of Fields (2003) and Yun (2006). Fields (2003) allows me to investigate the gross relative shares of each socio-economic variable in wage inequality, whereas Yun (2006), in which he weaves together the methodologies of JMP (1993) and Fields (2003), enables me to further decompose the gross relative shares into characteristics, coefficient and residual effects.

In what follows, I will first introduce the articles which furnished us with the innovative methodologies of JMP (1993), Fields (2003) and Yun (2006). Then I will present a review of the literature on wage inequality in Germany after reunification.

Juhn, Murphy and Pierce (1993) provide a methodology for analyzing changes in wage inequality between across time. They show that between 1963 and 1989, real average weekly wages for the least skilled workers declined by about 5% and wages for the most skilled workers rose by about 40%. They also find that the trend toward increased inequality was apparent within narrowly defined education and labor market experience groups. Their explanation for the general rise in returns to skill was that the demand for skill rose in the United States over the period of their study.

Gary Fields (2003) proposes a methodology for decomposing income inequalities and changes in income inequalities using standard semi-log regressions. His methodology is designed to answer questions of two kinds. First, how much income inequality is accounted for by each explanatory factor? Second, how much of the difference in income inequality is accounted for by each explanatory factor? One interesting aspect of this decomposition method in answering questions of the first type (level questions), is that it is applicable to all inequality measures. In other words, the decomposition results are independent of the inequality measure chosen. Fields analyses earnings inequality in the United States in the twenty years period 1979-1999, using data from the Annual Demographic Surveys (March supplements) to the 1980 and 2000 U.S. CPS. He concludes that amongst gender, race, schooling, potential experience, occupation, industry and region, schooling had the most explanatory power in explaining the levels of inequality as well as the increase of inequality within the period of the study.

Yun (2006) analyses changes in earnings inequality in the United States during 1969–1999. He uses data from the March annual demographic micro data files of the CPS, and combines the aforementioned methodologies of Fields (2003) and JMP (1993) for both aggregate and detailed decompositions of earnings inequality. He finds that education contributes to widening earnings inequality, while gender contributes to leveling earnings inequality. Also, Yun shows that the coefficient effect of individual factors dominates the characteristics effect, whereas, residuals were found to have the largest effect. Education was found to be the most important disequalizing factor among the observed factors.

All three of the aforementioned articles were analyzing data from the United States. However, there is also a fair amount of literature that analyses income inequality in Germany after its reunification on October 3rd, 1990. Most studies investigate and compare inequality in both the eastern part and the western part separately, and generally conclude that income inequality increased in former East Germany immediately after the fall of the Berlin Wall and started approaching the levels prevailing in the western part of the reunified country. There is also a considerable amount of agreement that returns to schooling in former East Germany also increased after reunification, while returns to experience remained stable and lower than the levels found in the west even after almost two decades (see Abraham and Houseman (1995), Prasad (2004), Gang et al. (2006), Yun (2007) and Orlowski and Riphahn (2008)). That suggests that the transition process might not have been as "rapid" as described by Gang et al. (2006), especially if we simultaneously consider the literature on wage convergence and growth between the east and the west, which generally indicates that even though wages in the east grew considerably during the first two years after reunification, they remained below their western counterparts (see Hunt (2001), Hunt (2002) and Gang et al. (2006))

Before reunification, Abraham and Houseman (1995) study earnings inequality in Germany during the 1980s, and compare the trend of inequality in Germany during that period to earnings inequality in the U.S. Using German social security data and the German Socio-Economic Panel, they conclude that earnings differentials overall have narrowed, particularly in the bottom half of the distribution. Also, as differentials between skill groups (i.e. unskilled blue collar, semi-skilled blue collar, skilled blue

collar workers and white collar workers) have risen slightly, differentials across education groups have remained relatively constant and differentials in earnings by age group have remained stable or even narrowed. These results were quite different from what has been found in the U.S. during that time by Juhn, Murphy and Pierce (1991) and (1993).

In an early stage immediately following reunification, Bird, Schwarze and Wagner (1994) analyze the influence of the transition of East Germany into a market economy on wages. They use data from the German Socio-Economic Panel for the period 1989-1991 and estimate standard Mincer type wage equations to investigate the changes in the wage structure. They conclude, like Krueger and Pischke (1992) did before, that returns to education were relatively stable and that returns to work experience were falling, telling the story that education in eastern Germany retained value while work experience did not during the first two years of the transition.

Biewen (2000) uses bootstrap methods to analyze inequality in equivalent income in Germany during the 1980s and 1990s, and test whether changes in inequality are statistically significant. Using the German Socio-Economic Panel, he analyses 13 cross-sections for residents of former West Germany during 1984-1996, 7 cross-sections for residents of former East Germany during 1990-1996 and 7 cross-sections for a comprehensive German population during 1990-1996. He concludes that income inequality in the West was relatively stable, while inequality in East Germany increased after reunification. However, given his sample period, Biewen concludes that inequality remained substantially higher in the western part of the country compared to the eastern part.

In yet another article, Biewen (2001) modifies the semi parametric methodology of DiNardo, Fortin and Lemieux (1996) to measure the effects of socio-economic variables on the income distribution in Germany. Using cross sectional data from the German Socio-Economic Panel, he concludes that declining participation rates of women, rising unemployment, and increasing dispersion of the income structure contributed largely to the increase in income inequality in East Germany from 1990 to 1995.

Also, Gang and Yun (2003) and Gang, Stuart and Yun (2006) analyze wage growth and change in wage inequality in eastern Germany during the transition era 1990-2000. They employ the 1990 – 2000 waves of the German Socio-Economic Panel. For the wage growth analysis, they implement the well known Oaxaca (1973) decomposition. They find that most of the wage growth happened in the first half of the decade and that the vast majority of the growth is due to the coefficient effect, rather than the characteristics effect. Also, the intercept showed to have had a leveling effect on wages during the period of study, which indicates that the transition had a significant impact on wage distribution. For analyzing the increase in wage inequality on the other hand, they implement the methodology introduced by Yun (2006). They find that increases in wage inequality in eastern Germany, like wage growth, is mainly explained by the coefficient effects. The characteristics effect had hardly any influence, indicating that change in wage inequality is largely due to changes in the wage structure, a result that is rather unsurprising for a transition economy. Interestingly, the residuals effect in analyzing changes in wage inequality had also a significant impact, which is consistent with the effect of the intercept in analyzing wage growth and hence shares a similar interpretation.

In this article I implement the Yun (2006) methodology in analyzing changes in wage inequality during the period that followed the one addressed by Gang and Yun (2003) and Gang et al. (2006), namely 1999-2006. I will particularly show that the rise in wage inequality in Germany will not be explained by the changes in the wage structure alone (i.e. the coefficient and residual effects) rather by the combination between changes in the wage structure and workers characteristics.

For a more recent sampling period, Gernandt and Pfeiffer (2007) analyze the evolution of wage inequality in West Germany from 1984 – 2005 and in East Germany from 1994 – 2005 using the German Socio-Economic Panel. They implement the JMP methodology for decomposing changes in real gross hourly wage inequality into characteristics, price and residuals effect. Their measure of inequality is the 90^{th} to 10^{th} percentiles of real gross hourly wages, as well as its two sub-groups, 90^{th} to 50^{th} and 50^{th} to 10^{th} percentiles. Despite that their measure of inequality is different from that of Gang et al. (2006) who used the log-variance of wages, the results seem to be in partial support of each other.

This is quite interesting given that Fields (2003) states that the relative contribution of a factor to overall inequality is invariant to the choice of inequality measure under six axioms proposed by Shorrocks (1982). Gernandt and Pfeiffer find that wage inequality was fairly stable with a tendency to decrease during 1984-1994, and then increased during 1994-2005. For West Germany the residual explained approximately two thirds of the change in wage inequality, whereas it explained 40% of wage inequality in East Germany. In the West, inequality occurred primarily within the group of workers with lower tenure, whereas in the East, a large part of the change in inequality was experienced among the group of high wage workers in the upper tail of the wage distribution. They explain that result by competition between both regions of Germany for high wage workers, who would migrate to the west if not paid sufficiently high in the eastern part of the country. Another interesting result was that the pattern of wage inequality in East Germany looked more like that for the U.S. in the 1980s as analyzed by Juhn et.al (1993). This suggests that the transition of the east into a market economy had a similar effect on wage inequality as the computer revolution in the U.S.

These results are very interesting. However, unlike in previous articles, Gang and Yun (2003), and Gang et al. (2006), the methodology implemented in their analysis does not allow for further decomposing each of the characteristics and price effects into relative shares of each variable. Furthermore, the residual effects in their decompositions were relatively high, which might be due to some misspecification of their wage equations.

Also, Gernandt and Pfeiffer (2008) investigate the wage convergence between East German workers and their West German counterparts. Furthermore, using more cross sections than in their previous paper, they show via a non-parametric matching procedure that in 1992 and 1994 wage inequality among West Germans was higher than inequality among their East German statistical twins. In 2000 and 2005 however, the levels of wage inequality in the east were higher than in the west. That indicated that at some point between 1994 and 2000, wage inequality in the east converged to the levels in the west.

Hence, in this article I complements the papers of Gernandt and Pfeiffer (2007) and (2008) by providing more details about the relative contributions of the characteristics and coefficient effects of each variable to changes in wage inequality in Germany,

including more variables in my wage equations and controlling for participation decisions. As a result, I expect the residual effects in the decompositions to be considerably smaller than those reported by Gernandt and Pfeiffer. I will also show the particular time when wage inequality in the eastern region converged to the levels in the west.

Orlowski and Riphahn (2008) investigate the wage structure and the returns to tenure and experience in Germany 16 years after reunification. In their empirical estimation of the wage equations, they control for endogeneity following Altonji and Shakotko (1987). Despite that their estimates are less likely to suffer from endogeneity bias, than standard ordinary least squares (OLS) estimates which are common in this type of literature, their results just confirm those found by Bird, Schwarze and Wagner (1994) and Krueger and Pischke (1992) in much earlier stages of East Germany's economic transition. They find that the wage-experience profile in East Germany is substantially flatter than in the West.

This article contributes to the existing literature by decomposing wage inequality in the eastern region, western region and reunified Germany using both the methodologies of Fields (2003) and Yun (2006), employing data from the German Socio-Economic Panel for the periods 1999-2002 and 2002-2006. In particular, I will investigate what happened to wage inequality in Germany after 1999, and examine whether there were any alterations in the way changes in wage inequality decompose into the characteristics, coefficient and residual effects. I also show how the decompositions in this article compare to the literature on the topic, especially the works of Yun (1999), Gang and Yun (2003) and Gang et al. (2006) who employ similar, but not identical, data and methodologies, and highlight and explain the main differences between our means and results.

II. DATA AND DESCRIPTIVE STATISTICS:

II.1. Data:

This section analyses data from the German Socio-Economic Panel for the period 1993-2006. This data set is a longitudinal panel of the population in Germany. It is a household based study which started in 1984 and in which adult household members are interviewed annually. Additional samples have been taken of households in East Germany since 1990 and immigrants in 1994, 1998, 2000, 2002 and 2006. As of 2007, there were about 12,000 households, and more than 20,000 adult persons sampled. The annual surveys are conducted by the German Institute for Economic Research (Deutsches Institut für Wirtschaftsforschung (DIW) Berlin). For a more detailed description of the panel see Wagner G., Frick J., and Schupp J. (2007) and Frick J., Jenkins S., Lillard D., Lipps O., and Wooden M. (2007).

The sample is restricted to individuals; males and females, 18 to 64 years of age, who are full time workers and have completed their education. It excludes employees who are on maternity leaves since they earn reduced wages, and those in the military and community service. Also, the sample excludes individuals who work in the agricultural sector due to the seasonal nature in that sector, and workers who are self-employed. Furthermore, following the sample design of Yun (1999) and Gang and Yun (2003) and Gang et al. (2006) that excludes outlying observations, individuals who earn more than Euro 50 per hour and work more than 100 hours per week are also excluded from the sample. Finally, the lowest 2% of the wage distribution was truncated.

II.2. Descriptive Statistics:

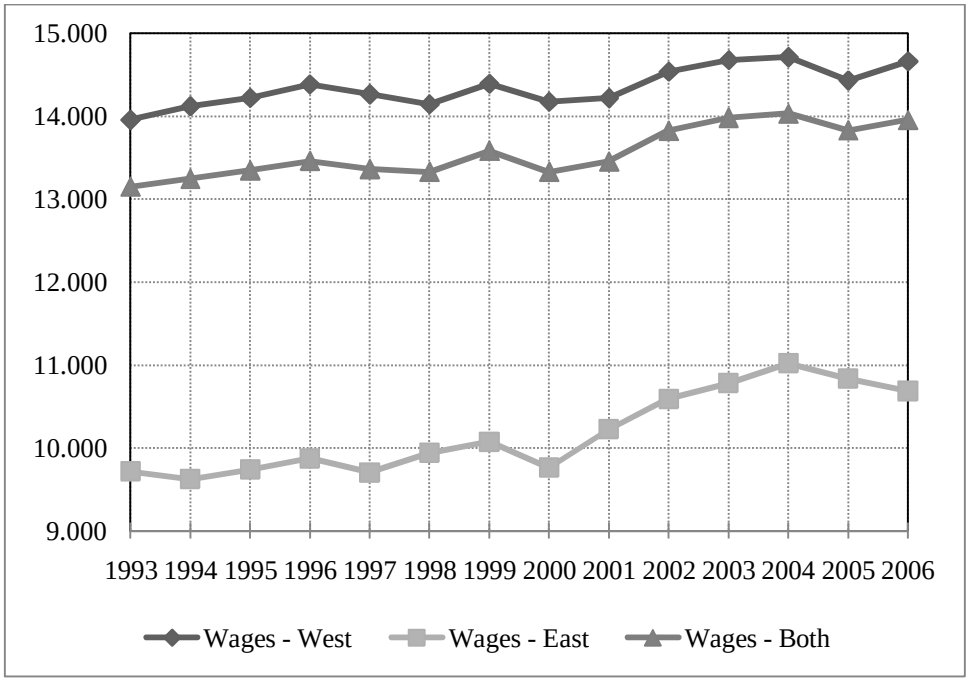
Below is a description of the levels and trends of the real hourly wages and wage inequality, and the characteristics of the sample used in this article.

II.2.1. Real Hourly Wages and Measures of Wage Inequality[2]:

The following is a presentation of the means of real hourly wage rates and four measures of inequality namely, the variance of log-wages, the coefficient of variation, the Gini

[2] Tables for the mean of real hourly wages and inequality measures are reported in appendix A.

coefficient, the Theil entropy index and the 90th to the 10th percentile ratio of real hourly wages in the regions of former West Germany, East Germany and reunified Germany during the period 1993 to 2006. It stands out that during 1993-1999 wages grew in all regions almost identically at a rate ranging between 3.12% - 3.69%, which might have contributed to the conclusion by some writers that most of the wage growth in the east happened during the first two to five years after reunification (see Bird et al. (1994) and Yun (1999). During 1999-2006 however, the increase in wages was only 1.87% in the west, as high as 6.07% in the east and 2.75% both regions combined. Figure (1) shows the levels of the wage rate in Germany during 1993-2006.



Source: Author

Figure 1: Mean of Real Hourly Wages (Constant 2001 Euros)

It is obvious that wages in the west, east and reunified Germany shared a similar trend up to 1999, but started to grow faster in the east afterwards. Also, the level of real hourly wages was clearly lower in the east as compared to the west for the entire period.

The inequality measures tell a somewhat different story. They all show a rather moderate increase in the level of wage inequality during the period 1993-1999, and then a relatively sharp rise in the period of 1999-2002, and then again a moderate trend during

the period 2002 - 2006 in all regions. This persistent pattern of all four inequality measures across the west, east and reunified Germany signals that the driving force behind wage inequality during 1999 – 2002 might have been different from that prevailing before that period and after. Figures (2) to (4) demonstrate that all five measures reported in this article have similar trends, without exception.

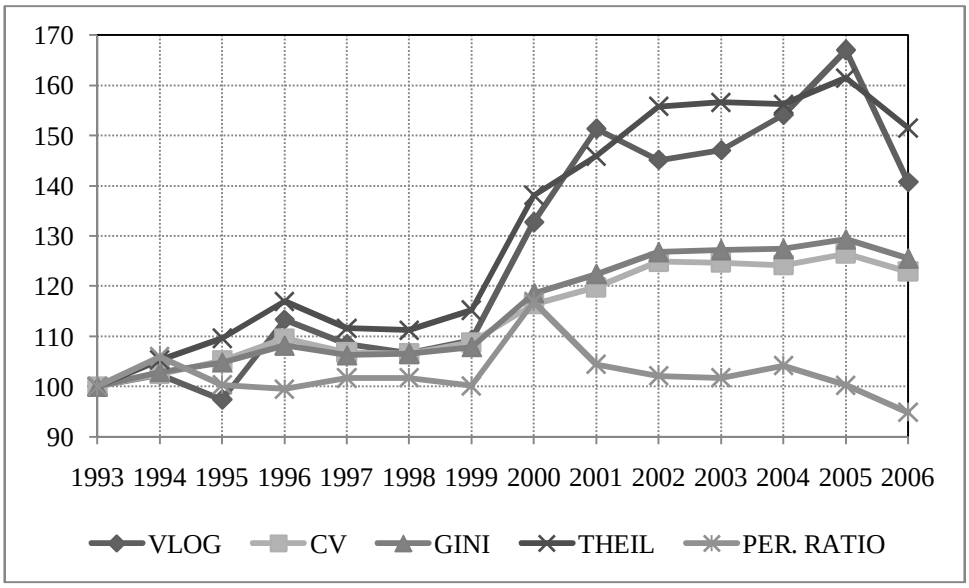


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Figure 2: Measures of Inequality in the Western Region (1993 = 100)

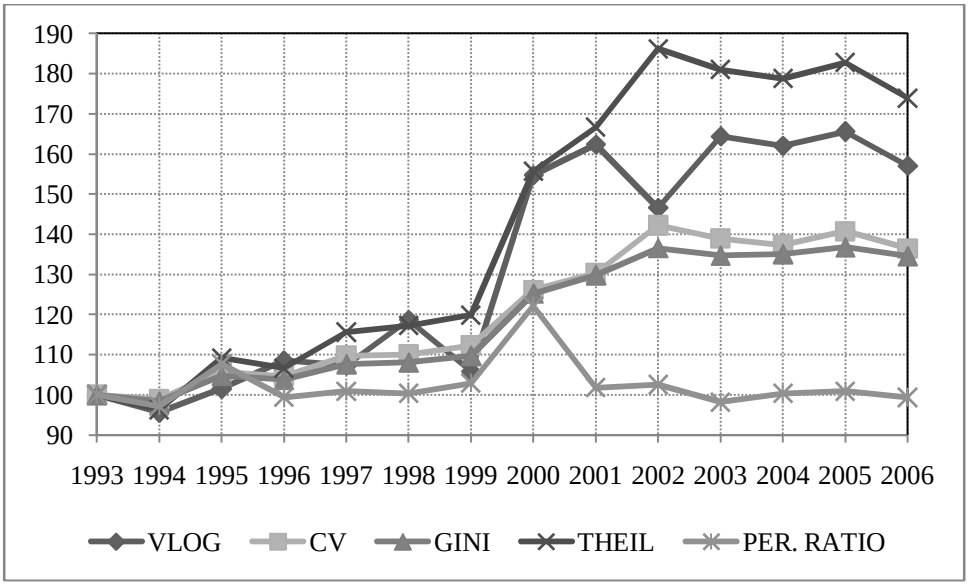

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Figure 3: Measures of Inequality in the Eastern Region (1993 = 100)

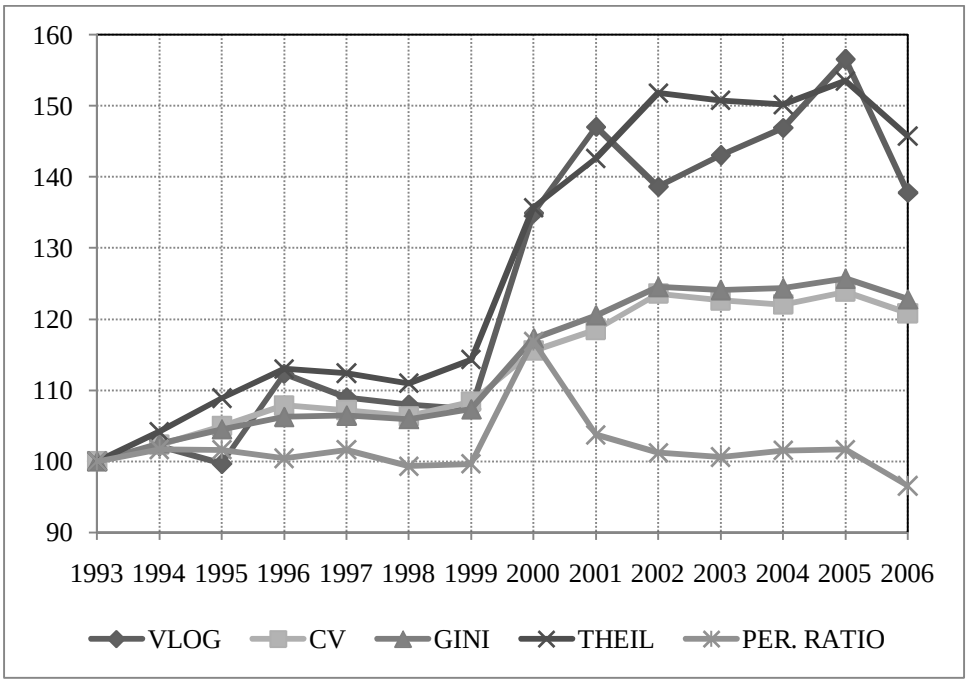

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Figure 4: Measures of Inequality in Reunified Germany (1993 = 100)

During 1993-1999 wage inequality as measured by the variance of log-wages increased by 9.26%, 5.89% and 7.36% in the west, east and both regions combined respectively. During the period 1999 - 2002, wage inequality increased remarkably all across the country. In the west it rose by 32.80%, in the east by 38.41% and in both regions combined inequality increased by 29.11%. This surge in inequality however, did not continue and the trends returned to what was prevailing during the pre-1999 period. In fact, inequality even decreased by 3.03% and 0.60% in the west and both regions combined, and showed a moderate increase of 7.14% in the eastern region.

This observation triggers the curious questions; what happened to the wage structure in Germany during 1999 - 2002? How does the decomposition of the change in wage inequality during that period compare to the decade of the nineties, as analyzed by Yun (1999), Gang and Yun (2003) and Gang et al. (2006), and the period of 2002 – 2006 that followed? Also, given the similar trends of wage inequality during the periods 1990 –

2000, and 2002 – 2006, would the decomposition of the changes in wage inequality for these two periods look similar too? This article will contribute to the literature on the topic by answering those questions.

Furthermore, figures (5) to (9) yet reveal another interesting part of the story of the transition of the east into a market economy. According to all four measures of inequality, the level of wage dispersion in the east has caught up with the level prevailing in the west by 1999/2000, which brings this year into the spotlight once more. In fact, it seems that wage inequality in the east even started to exceed the levels in the west after that year. The figures show that inequality in Germany after 1999 followed an inverted U-shape, where the level of inequality in the east exceeded the levels in the west at least in five years out of the eight year period from 1999-2006. Before that, inequality in the west was most of the time higher than it was in the east. However, in order to make meaningful inferences about the statistical significance of the difference in changes of wage inequality between the east and the west, one ought to implement more involved methods, which are beyond the intended scope of this article (see Biewen (2000)).

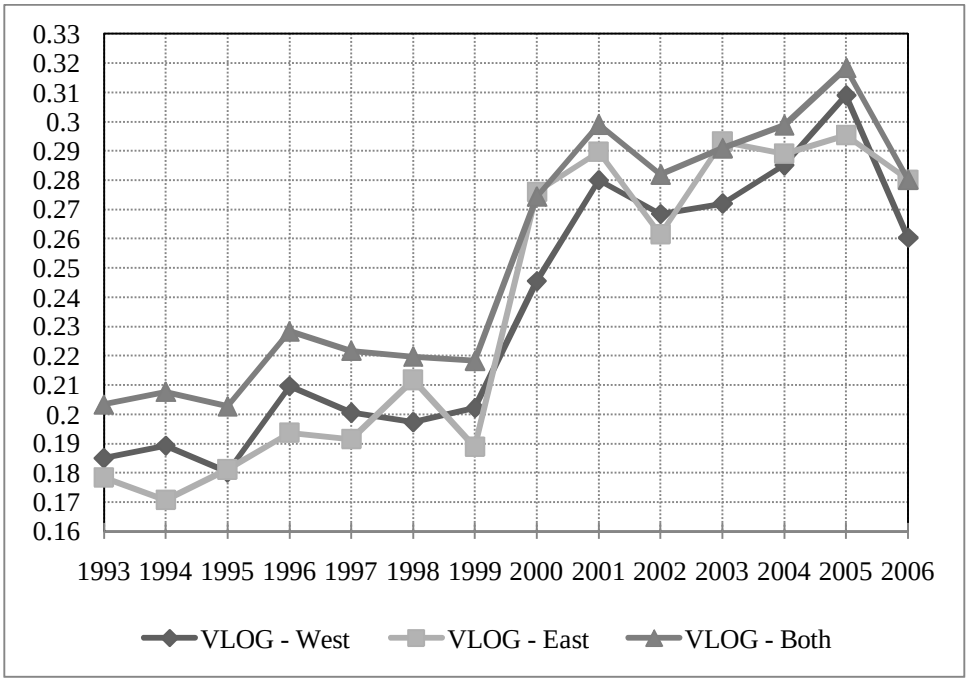

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Figure 5: The Variance of Log-Wages in Levels

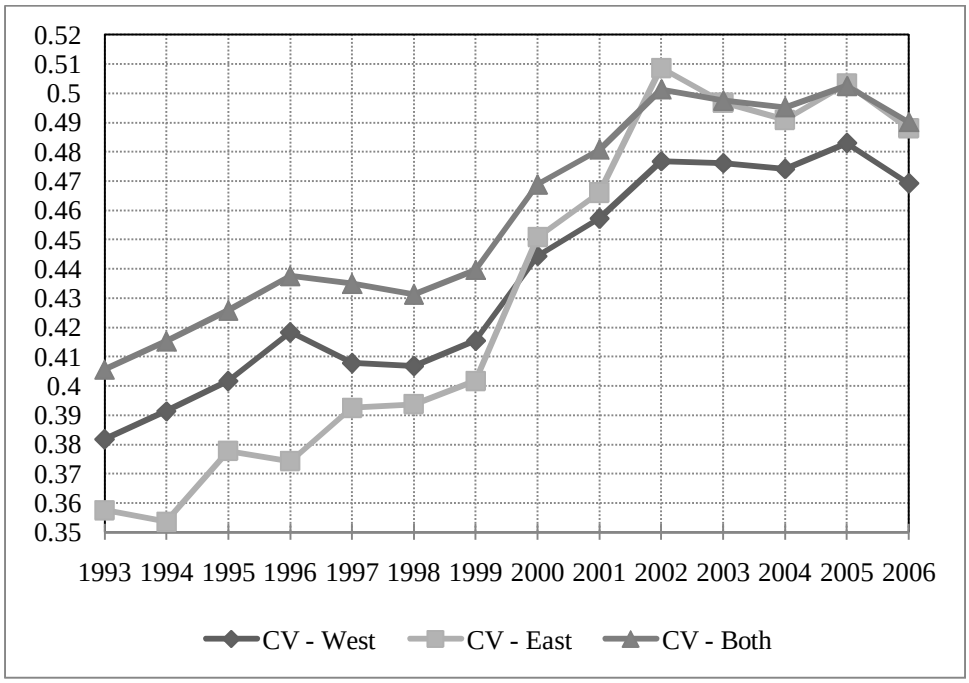

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Figure 6: The Coefficient of Variation in Levels

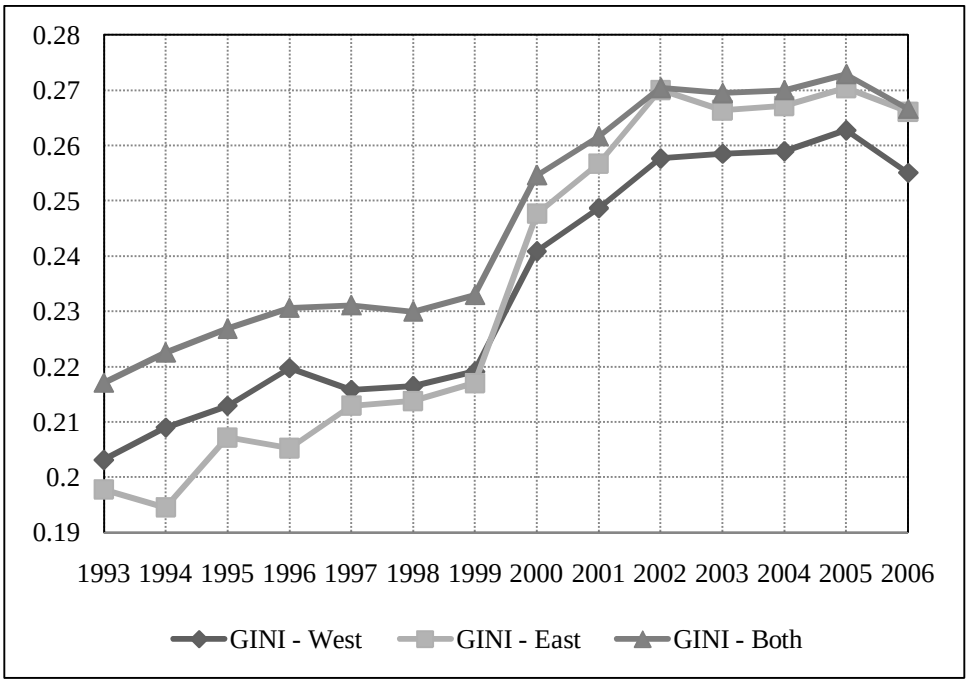

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Figure 7: The Gini Coefficient in Levels

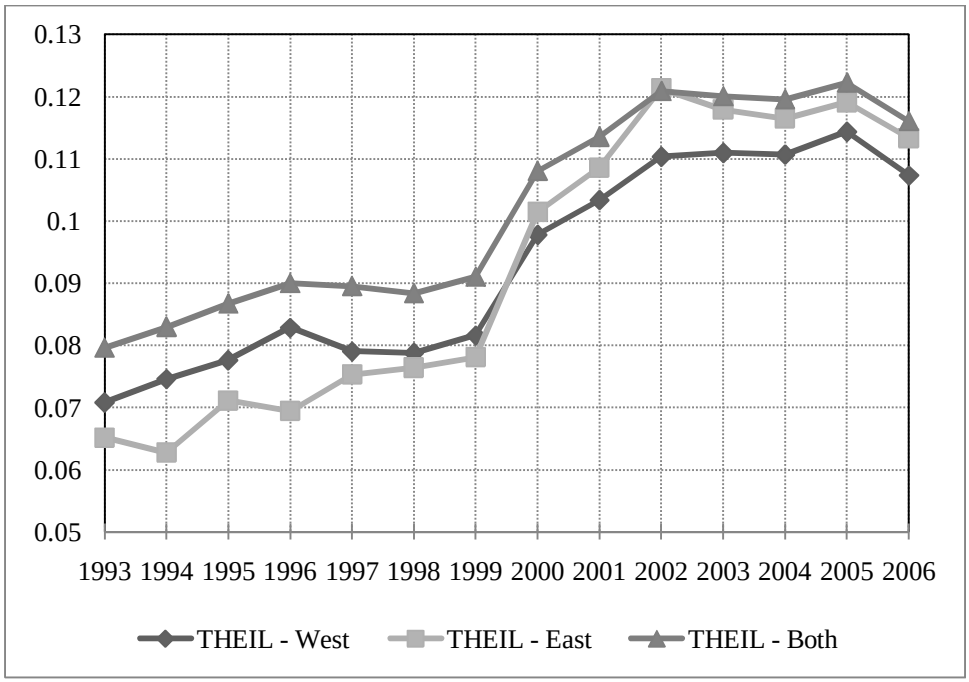

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Figure 8: The Theil Entropy Index

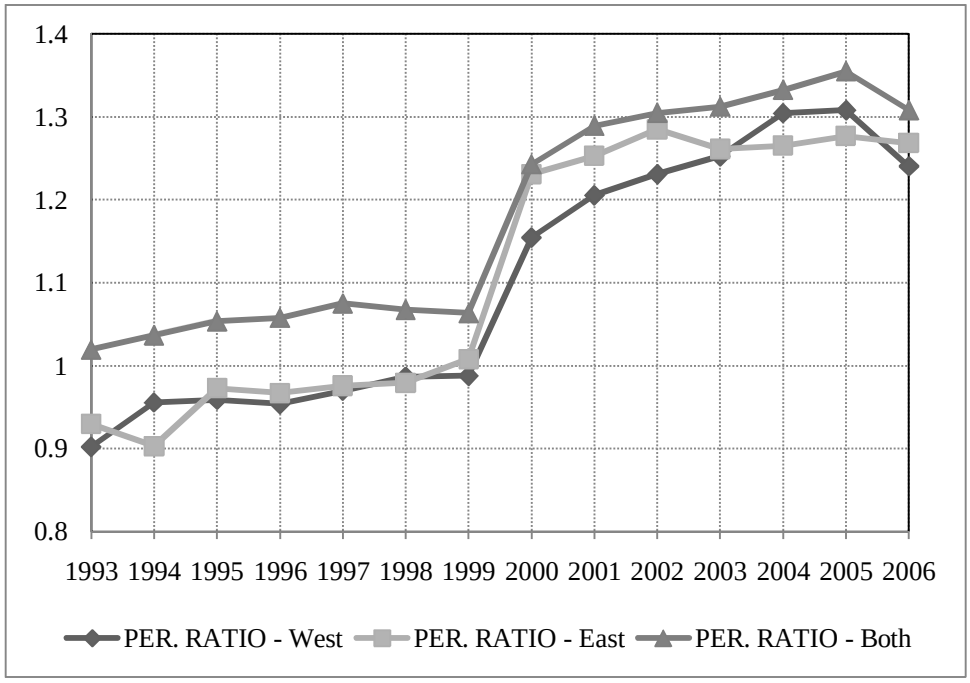

Figure 9: The 90th to the 10th Percentile Difference in Log Wages

II.2.2. Divergence between Real Hourly Wages and Wage Inequality:

Gang et al. (2006) argue that most literature on wage structure addresses either wage growth or wage inequality, whereas it is optimal to analyze both moments together, in order to arrive at a more comprehensive and intuitive understanding of the matter. Although I do not disagree with that view, figures (10) to (12) clearly show a rather diverging trend between real hourly wages and wage inequality after 1999, suggesting that indeed, "There is no *a priori* relationship between wage growth and changes in wage inequality" Gang el al. (2006). In other words, as wages showed a relatively mild positive trend, wage inequality increased rapidly during 1999 - 2006 in the west and in the east alike. Therefore, it seems proper to conclude that the factors that determine wage growth might not simultaneously have a similar effect on changes in wages inequality. Hence, I will focus in this article only on one moment of the wage distribution namely, wage inequality.

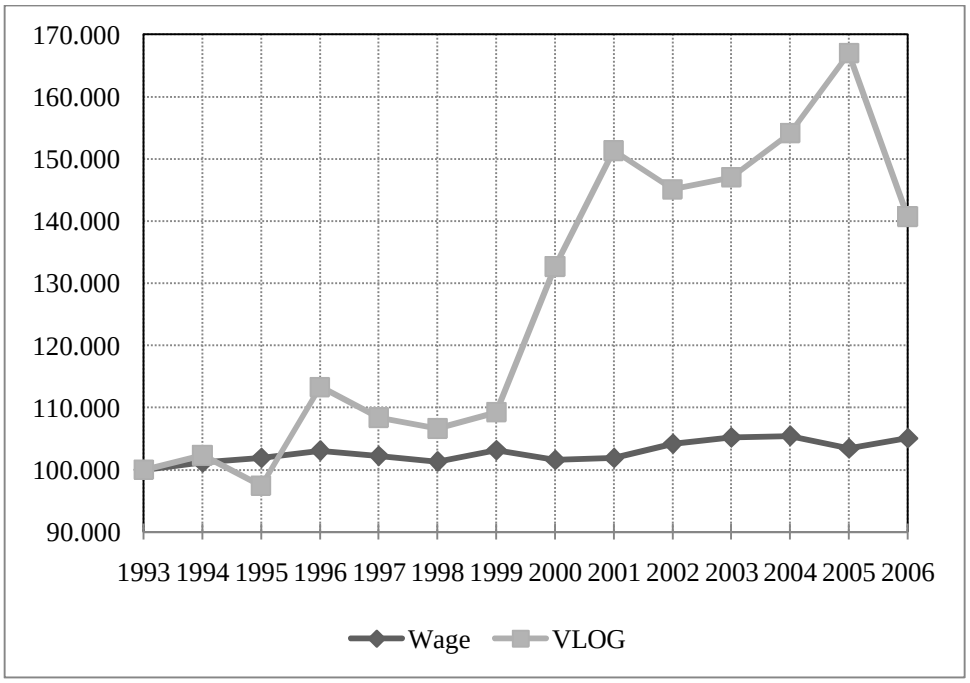

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Figure 10: Real Wages and Variance of Log-Wages in the Western Region (1993 = 100)

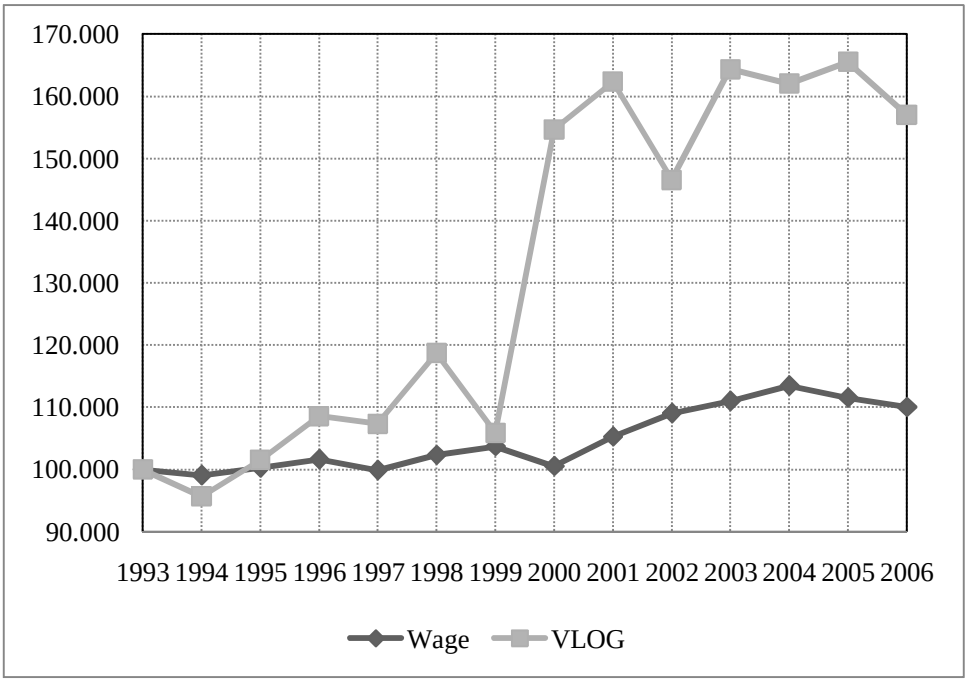

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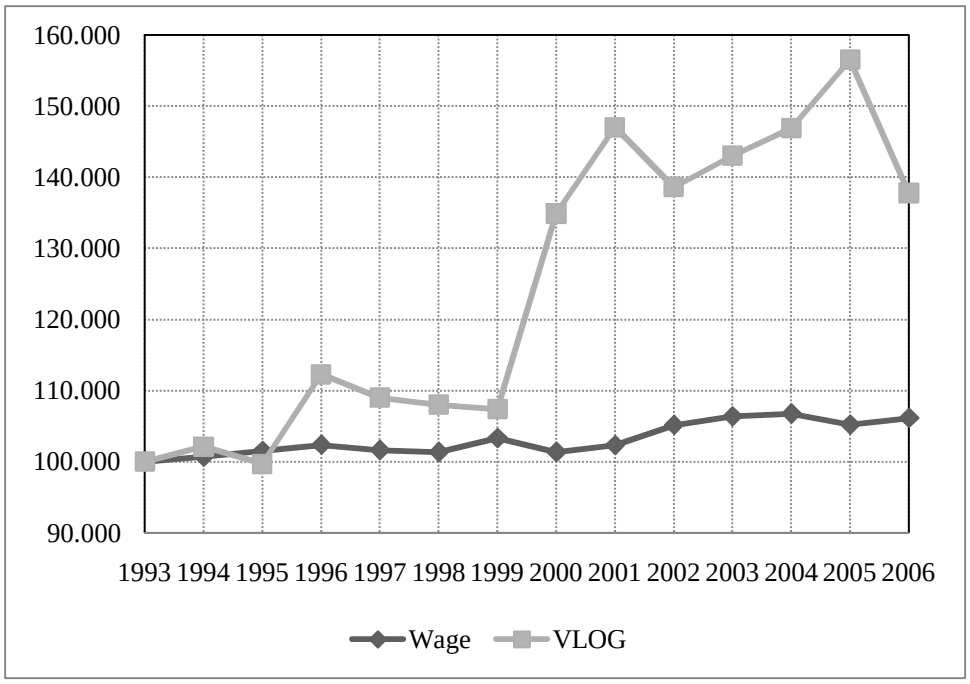
Figure 11: Real Wages and Variance of Log-Wages in the Eastern Region (1993 = 100)



Source: Author

Figure 12: Real Wages and Variance of the Log-Wages in Reunified Germany (1993 = 100)

II.2.3. Sample Characteristics:

Tables (1) to (3) represent the sample means and standard errors of the variables used in this article for the western region, eastern region and both regions of reunified Germany respectively. The human capital variables are age, gender, whether the individual is native or a foreigner, number of children, number of adults living in the individual's household, education (in years and the highest degree attained), language proficiency, potential experience, tenure, and marital status. In addition to those variables, I include the individual's industry, company size, the individual's training-occupation match, occupational position and the region of residence. The periods of interest are 1999 – 2002 and 2002 – 2006.

II.2.3.1. Sample Characteristics during 1999 – 2002:

During this period the mean of ages decreased by 2.17% in the west, slightly increased by 0.85% in the east and decreased in reunified Germany by 1.63%. Males decreased in the west by 2.23%, increased in the east by 1.61% and decreased in reunified Germany by 1.55%. The number of observations for foreigners in the eastern region is negligible. Hence, the increase of 1.83% of the mean number of natives in reunified Germany comes solely from the western region.

The mean number of years of education increased by 2.52%, 1.11% and 2.21% in the west, east and reunified Germany respectively. This confirms the 12.75%, 11.67% and 12.65% increases in the university degree attainment in the west east and reunified Germany respectively. Also, the mean number of foreigners who spoke only or mostly the language of their country of origin decreased remarkably by 47.04%.

Potential experience decreased in the west by 5.19%, slightly increased in the east by 0.92% and decreased in reunified Germany by 4.09%. Also, tenure decreased in the west by 3.52%, increased in the east by 3.15%, and decreased in reunified Germany by 2.38%.

One interesting socio-demographic change was the 8.85%, 11.10% and 9.43% decreases in married individuals in the west, east and reunified Germany respectively. Such a change is expected to influence the participation decisions of individuals.

The distribution of workers among industries was also an interesting aspect of this sample. In the west it is obvious that there was a shift from the energy, mining and manufacturing sectors which decreased by 33.19%, 52.79% and 9.75% respectively, to the construction, transportation, banking and insurance and the services sectors, which increased by 5.93%, 12.81%, 9.87% and 5.78% respectively. In the east, the shift was mainly away from the mining and banking and insurance sectors, which decreased by 27.22% and 32.25% respectively, towards trade that increased by 14.79%. Looking at reunified Germany however, it is clear that the structural changes in the west dictated the overall change in the country for that period. This is confirmed by the decreases in the energy, mining and manufacturing sector by 25.81%, 49.36% and 9.06% respectively, and the increases in construction, transportation, banking and insurance and services by 4.29%, 8.07%, 5.56% and 4.79% respectively.

On the other hand, the mean number of individuals employed by small companies (less that 20 individuals) increased by 12.13%, 0.54% and 8.73% in the west, east and reunified Germany respectively, whereas the mean number of individuals employed by larger companies (more than 2000 individuals) decreased by 6%, 1.10% and 5.11% in the west, east and reunified Germany respectively. Also, there was an overall 4.30% decrease in reunified Germany in individuals who were not working in an occupation trained for, and a 1.12% increase in those who were working in an occupation trained for. These trends were again, driven by the trends in the western region.

Finally, the mean number of blue collar workers decreased by 10.88%, 16.32% and 12.16% in the west, east and reunified Germany respectively. Also the mean number of individuals in the position of foreman decreased by 27.59%, 18.70% and 25.98% in the west, east and reunified Germany respectively, whereas the mean number of individuals working as qualified and highly qualified professionals increased by 5.68%, 6.22% and 5.77% in the west, east and reunified Germany respectively.

II.2.3.2. Sample Characteristics during 2002 – 2006:

During this period, the mean of ages increased by 3.29%, 1.02% and 2.87% in the west, east and reunified Germany respectively. Males decreased in the west by 1.76%,

increased in the east by 0.68% and decreased in reunified Germany by 1.35%. During this period as in the previous one, the increase of 0.89% of the mean number of natives in reunified Germany comes solely from the western region.

The mean number of years of education increased by 1.48%, 1.00% and 1.39% in the west, east and reunified Germany respectively. Hence, university degree attainment increased only by 8.74%, 9.04% and 8.82% in the west east and reunified Germany respectively. The mean number of foreigners who spoke only or mostly the language of their country of origin decreased in reunified Germany by only 2.78%.

Potential experience increased in the west by 5.22%, increased in the east by 1.31% and increased in reunified Germany by 4.50%. Also, tenure increased by 9.19%, 14.61%, and 10.06%, in the west, east and reunified Germany respectively. Married individuals in this period too continued to decrease by 0.90%, 13.28% and 3.39% in the west, east and reunified Germany respectively.

During this period, the distribution of workers in the western region shifted from the energy, construction and banking and insurance sectors, which decreased by 9.14%, 15.44% and 7.46% towards mining and services, which increased by 12.80% and 6.41% respectively. In the east, manufacturing, construction, trade and banking and insurance decreased by 19.47%, 15.23%, 32.59% and 15.58% respectively, whereas mining and services increased by 22.70% and 22.62% respectively. In both regions combined, energy, construction and banking and insurance decreased by 7.11%, 15.39% and 7.87% respectively, whereas mining and services increased by 14.60% and 9.72%.

As for the distribution of workers according to the company size, there was a general movement towards small and medium sized companies. The mean number of workers employed by small companies (companies with less than 20 workers) increased by 2.10%, 3.58% and 2.34% in the west, east and reunified Germany, whereas the mean number of workers employed by large companies (companies with more than 2000 workers) decreased by 2.72% in the west, increased by 7.65% in the east and decreased in reunified Germany by 1.44%. With respect to the occupation/training match, workers

working in occupations trained for increased by 1.28%, 2.91% and 1.57% in the west, east and reunified Germany respectively.

Finally, the mean number of blue collar workers and managers decreased in the west by 9.09% and 16.23%, while white collar workers and foremen increased by 12.14% and 24.06% respectively. In the east, white collar workers decreased by 19.38% and civil service workers, foremen and managers increased by 15.27%, 19.26% and 49.56% respectively.

In the context of this article, in which I decompose changes in wage inequality into characteristics, coefficient and residual effects, it is important to notice the differences in the sample characteristics between the two periods 1999 – 2002 and 2002 – 2006. These can be summarized by that during the first period; there was a greater change in the distribution of educational attainment towards higher degrees, a much greater decrease in the mean number of foreigners who did not use German language (i.e. an increase in language proficiency of foreign workers), remarkably smaller increases in potential experience and tenure, noticeably greater shifts from the energy, mining and manufacturing sectors towards construction, transportation and banking and insurance, a clearer shift from employment in larger companies towards employment in small businesses, a significantly larger increase in the mean number of workers who were in training or had no training, and finally a quite different distribution of workers among occupational positions.

In the empirical section, I will investigate how much of the differences in wage inequality, measured by the difference in the variance of the log-wage, could be attributed to the differences in variances of the aforementioned sample characteristics between the two periods (characteristics effect), how much of it could be attributed to the differences in variances of the returns to the sample characteristics (coefficient effect) and how much is due to the variances residuals (residual effect).

Table 1: Sample Means and Standard Errors in the Western Region

	1999		2002		2006		%Δ	%Δ
	Mean	S.E.	Mean	S.E.	Mean	S.E.	('99 - '02)	('02 - '06)
Real Hourly Wage (2001 Euros)	14.394	0.118	14.539	0.100	14.664	0.116	1.008	0.858
Age	41.261	0.208	40.365	0.168	41.694	0.191	-2.173	3.292
Gender (Male = 1)	0.679	0.009	0.663	0.007	0.652	0.008	-2.279	-1.763
Native (German = 1)	0.904	0.006	0.926	0.004	0.937	0.004	2.377	1.186
Number of Children	0.529	0.017	0.533	0.014	0.478	0.015	0.870	-10.462
Number of Adults	2.086	0.015	2.047	0.013	2.025	0.015	-1.868	-1.067
Education (Years)	12.112	0.052	12.417	0.041	12.602	0.048	2.516	1.484
Highest Educational Degree								
Elementary School	0.031	0.003	0.012	0.002	0.010	0.002	-61.568	-13.594
Secondary School 1	0.081	0.005	0.063	0.004	0.049	0.004	-21.951	-21.469
Secondary School 2	0.599	0.009	0.604	0.007	0.597	0.009	0.848	-1.187
High-school	0.034	0.003	0.033	0.003	0.030	0.003	-2.464	-8.663
University (Ref. Gr.)	0.255	0.008	0.288	0.007	0.313	0.008	12.753	8.743
Language Proficiency								
Only or Mostly Language of Origin	0.018	0.003	0.009	0.001	0.009	0.002	-47.535	-3.054
Both Languages Equally	0.044	0.004	0.027	0.002	0.024	0.003	-38.211	-12.357
Mostly German	0.060	0.005	0.030	0.003	0.077	0.005	-49.213	152.120
Only German (Ref. Gr.)	0.878	0.006	0.933	0.004	0.890	0.006	6.255	-4.573
Potential Experience	23.149	0.212	21.948	0.171	23.092	0.199	-5.189	5.215
Tenure	11.992	0.196	11.570	0.156	12.633	0.185	-3.523	9.193
Marital Status								
Married (Ref. Gr.)	0.568	0.009	0.518	0.008	0.513	0.009	-8.854	-0.903
Single	0.315	0.009	0.369	0.007	0.359	0.009	17.232	-2.535
Divorced, Widowed or Separated	0.117	0.006	0.113	0.005	0.127	0.006	-3.321	12.384
Industry								
Energy (Ref. Gr.)	0.016	0.002	0.010	0.002	0.010	0.002	-33.189	-9.143
Mining	0.009	0.002	0.004	0.001	0.005	0.001	-52.785	12.800
Manufacturing	0.250	0.008	0.226	0.006	0.225	0.007	-9.751	-0.319
Construction	0.139	0.007	0.147	0.005	0.125	0.006	5.928	-15.436
Trade	0.133	0.007	0.129	0.005	0.133	0.006	-3.016	2.952
Transportation	0.051	0.004	0.058	0.004	0.059	0.004	12.809	2.060
Banking and Insurance	0.055	0.004	0.060	0.004	0.056	0.004	9.865	-7.457
Service	0.346	0.009	0.365	0.007	0.388	0.009	5.279	6.413
Company Size								
Less than 20 (Ref. Gr.)	0.160	0.007	0.180	0.006	0.184	0.007	12.132	2.081
Between 20 and 200	0.272	0.009	0.287	0.007	0.278	0.008	5.546	-3.161
Between 200 and 2000	0.271	0.009	0.254	0.007	0.267	0.008	-6.186	5.079
More than 2000	0.296	0.009	0.279	0.007	0.271	0.008	-5.998	-2.719
Occupation/Training Match								
Works in Occupation Trained for (Ref. Gr.)	0.630	0.009	0.642	0.007	0.650	0.008	1.945	1.280
Doesn't Work in Occupation Trained for	0.301	0.009	0.285	0.007	0.278	0.008	-5.430	-2.379
In Training or No Training	0.069	0.005	0.073	0.004	0.072	0.005	5.924	-1.975
Occupational Position								
Blue Collar (Ref. Gr.)	0.289	0.009	0.258	0.007	0.234	0.008	-10.882	-9.092
White Collar	0.091	0.006	0.083	0.004	0.093	0.005	-8.778	12.136
Civil Service	0.109	0.006	0.108	0.005	0.099	0.005	-1.549	-7.870
Qualified & Highly Qualified Professional	0.427	0.009	0.452	0.008	0.478	0.009	5.680	5.747
Foreman	0.053	0.004	0.038	0.003	0.048	0.004	-27.591	24.058
Managerial	0.024	0.003	0.023	0.002	0.019	0.002	-2.916	-16.233

Source: Author

Table 2: Sample Means and Standard Errors in the Eastern Region

	1999		2002		2006		%Δ	%Δ
	Mean	S.E.	Mean	S.E.	Mean	S.E.	('99 - '02)	('02 - '06)
Real Hourly Wage (2001 Euros)	10.076	0.123	10.595	0.128	10.688	0.169	5.144	0.884
Age	41.135	0.310	41.484	0.278	41.908	0.324	0.847	1.023
Gender (Male = 1)	0.579	0.015	0.588	0.013	0.592	0.015	1.611	0.675
Number of Children	0.564	0.023	0.483	0.019	0.427	0.023	-14.487	-11.627
Number of Adults	2.267	0.025	2.190	0.022	2.027	0.025	-3.389	-7.455
Education (Years)	12.759	0.074	12.901	0.065	13.030	0.076	1.111	0.996
Highest Educational Degree								
Elementary School	0.008	0.003	0.001	0.001	0.001	0.001	-86.645	38.163
Secondary School 1	0.019	0.004	0.012	0.003	0.015	0.004	-37.277	27.494
Secondary School 2	0.607	0.015	0.616	0.013	0.594	0.015	1.505	-3.625
High-school	0.133	0.010	0.111	0.008	0.106	0.009	-16.852	-4.394
University (Ref. Gr.)	0.233	0.013	0.260	0.012	0.283	0.014	11.672	9.036
Potential Experience	22.376	0.312	22.583	0.279	22.879	0.323	0.924	1.311
Tenure	9.220	0.264	9.510	0.225	10.899	0.276	3.145	14.606
Marital Status								
Married (Ref. Gr.)	0.668	0.014	0.594	0.013	0.515	0.015	-11.098	-13.275
Single	0.251	0.013	0.288	0.012	0.326	0.014	14.845	13.039
Divorced, Widowed or Separated	0.081	0.008	0.118	0.009	0.160	0.011	45.272	34.859
Industry								
Energy (Ref. Gr.)	0.020	0.004	0.020	0.004	0.020	0.004	1.815	-1.554
Mining	0.006	0.002	0.005	0.002	0.006	0.002	-27.223	22.698
Manufacturing	0.197	0.012	0.185	0.010	0.149	0.011	-6.090	-19.467
Construction	0.145	0.011	0.141	0.009	0.120	0.010	-2.685	-15.225
Trade	0.106	0.009	0.122	0.009	0.082	0.008	14.791	-32.587
Transportation	0.070	0.008	0.066	0.007	0.066	0.008	-6.348	0.161
Banking and Insurance	0.031	0.005	0.021	0.004	0.018	0.004	-32.249	-15.567
Service	0.425	0.015	0.441	0.013	0.540	0.015	3.793	22.615
Company Size								
Less than 20 (Ref. Gr.)	0.252	0.013	0.253	0.012	0.262	0.014	0.537	3.578
Between 20 and 200	0.369	0.015	0.365	0.013	0.359	0.015	-1.096	-1.617
Between 200 and 2000	0.213	0.012	0.217	0.011	0.201	0.012	2.124	-7.254
More than 2000	0.166	0.011	0.165	0.010	0.177	0.012	-1.095	7.652
Occupation/Training Match								
Works in Occupation Trained for (Ref. Gr.)	0.606	0.015	0.588	0.013	0.605	0.015	-2.940	2.910
Doesn't Work in Occupation Trained for	0.373	0.015	0.375	0.013	0.334	0.015	0.665	-11.087
In Training or No Training	0.021	0.004	0.037	0.005	0.061	0.007	72.016	66.873
Occupational Position								
Blue Collar (Ref. Gr.)	0.349	0.014	0.292	0.012	0.302	0.014	-16.323	3.380
White Collar	0.096	0.009	0.099	0.008	0.080	0.008	3.330	-19.377
Civil Service	0.049	0.007	0.055	0.006	0.063	0.007	10.933	15.273
Qualified & Highly Qualified Professional	0.434	0.015	0.461	0.013	0.432	0.015	6.224	-6.345
Foreman	0.054	0.007	0.044	0.005	0.052	0.007	-18.696	19.256
Managerial	0.016	0.004	0.014	0.003	0.020	0.004	-14.782	49.560

Source: Author

Table 3: Sample Means and Standard Errors in Reunified Germany

	1999		2002		2006		%Δ	%Δ
	Mean	S.E.	Mean	S.E.	Mean	S.E.	('99 - '02)	('02 - '06)
Real Hourly Wage (2001 Euros)	13.584	0.098	13.829	0.085	13.958	0.101	1.807	0.929
Age	41.238	0.174	40.566	0.145	41.732	0.165	-1.628	2.873
Gender (Male = 1)	0.660	0.008	0.650	0.006	0.641	0.007	-1.551	-1.345
Native (German = 1)	0.922	0.004	0.939	0.003	0.948	0.003	1.831	0.886
Number of Children	0.535	0.014	0.524	0.011	0.469	0.013	-2.095	-10.632
Number of Adults	2.120	0.013	2.072	0.011	2.025	0.013	-2.225	-2.282
Education (Years)	12.234	0.043	12.504	0.035	12.678	0.041	2.211	1.385
Highest Educational Degree								
Elementary School	0.027	0.003	0.010	0.001	0.009	0.001	-62.602	-12.432
Secondary School 1	0.069	0.004	0.054	0.003	0.043	0.003	-22.193	-19.328
Secondary School 2	0.600	0.008	0.606	0.006	0.596	0.008	0.956	-1.632
High-school	0.053	0.004	0.047	0.003	0.044	0.003	-10.407	-7.237
University (Ref. Gr.)	0.251	0.007	0.283	0.006	0.308	0.007	12.651	8.816
Language Proficiency								
Only or Mostly Language of Origin	0.015	0.002	0.008	0.001	0.007	0.001	-47.038	-2.777
Both Languages Equally	0.036	0.003	0.022	0.002	0.020	0.002	-37.625	-12.107
Mostly German	0.050	0.004	0.025	0.002	0.065	0.004	-49.210	154.128
Only German (Ref. Gr.)	0.900	0.005	0.944	0.003	0.908	0.004	4.999	-3.835
Potential Experience	23.004	0.177	22.062	0.147	23.054	0.170	-4.094	4.498
Tenure	11.472	0.162	11.199	0.132	12.325	0.157	-2.379	10.057
Marital Status								
Married (Ref. Gr.)	0.587	0.008	0.532	0.007	0.514	0.008	-9.432	-3.390
Single	0.303	0.007	0.354	0.006	0.353	0.007	17.066	-0.233
Divorced, Widowed or Separated	0.110	0.005	0.114	0.004	0.133	0.005	3.371	16.511
Industry								
Energy (Ref. Gr.)	0.016	0.002	0.012	0.001	0.011	0.002	-25.812	-7.106
Mining	0.009	0.002	0.004	0.001	0.005	0.001	-49.364	14.600
Manufacturing	0.240	0.007	0.218	0.005	0.212	0.006	-9.056	-3.152
Construction	0.140	0.006	0.146	0.005	0.124	0.005	4.291	-15.391
Trade	0.128	0.005	0.128	0.004	0.124	0.005	-0.199	-3.061
Transportation	0.055	0.004	0.059	0.003	0.060	0.004	8.073	1.651
Banking and Insurance	0.051	0.004	0.053	0.003	0.049	0.003	5.559	-7.871
Service	0.361	0.008	0.378	0.006	0.415	0.008	4.789	9.716
Company Size								
Less than 20 (Ref. Gr.)	0.178	0.006	0.193	0.005	0.198	0.006	8.725	2.339
Between 20 and 200	0.290	0.007	0.301	0.006	0.293	0.007	3.754	-2.887
Between 200 and 2000	0.260	0.007	0.248	0.006	0.255	0.007	-4.801	3.195
More than 2000	0.272	0.007	0.258	0.006	0.254	0.007	-5.112	-1.444
Occupation/Training Match								
Works in Occupation Trained for (Ref. Gr.)	0.625	0.008	0.632	0.006	0.642	0.007	1.122	1.570
Doesn't Work in Occupation Trained for	0.314	0.008	0.301	0.006	0.288	0.007	-4.296	-4.377
In Training or No Training	0.060	0.004	0.067	0.003	0.070	0.004	10.782	4.870
Occupational Position								
Blue Collar (Ref. Gr.)	0.300	0.007	0.264	0.006	0.246	0.007	-12.155	-6.669
White Collar	0.092	0.005	0.086	0.004	0.091	0.004	-6.545	5.647
Civil Service	0.098	0.005	0.098	0.004	0.093	0.004	0.043	-5.467
Qualified & Highly Qualified Professional	0.429	0.008	0.453	0.007	0.470	0.008	5.766	3.556
Foreman	0.053	0.004	0.039	0.003	0.048	0.003	-25.976	23.065
Managerial	0.022	0.002	0.021	0.002	0.019	0.002	-4.186	-8.695
Region	0.812	0.006	0.820	0.005	0.822	0.006	0.947	0.286

Source: Author

III. METHODOLOGY:

I implement in this section the decomposition methodologies of Fields (2003) and Yun (2006) to analyze the changes in wage inequality in the western region, eastern region and reunified Germany during the periods 1999-2002 and 2002 - 2006. As Mentioned before, the reason why I subdivide the period between 1999 and 2006 into those two sub-periods, is that wage inequality during the first three years increased sharply, while was relatively stable during the four years that followed. Therefore, decomposing wage inequality directly between 1999 and 2006 will lead to a loss in information. I first decompose changes in inequality in the western region, then in the eastern region, and then I decompose changes in wage inequality considering both regions together, and compare the results.

Contrarily to the common use of OLS, which with the presence of sample selection produces biased estimates, I implement the Heckman maximum likelihood procedure[3], hereafter ML, to account for possible selection bias. The main difference between the traditional Heckman two-step method and the ML is that the two-step method estimates the second step via OLS, whereas the ML uses a full maximum likelihood approach, and estimates the wage and participation equations jointly. The ML is considered a more attractive approach than both the OLS and the traditional Heckman two-step method mainly because it produces not only consistent estimates, but also ones that are asymptotically efficient and normally distributed. Furthermore, it is flexible enough to apply to any kind of selection issue (see Co et al. (2000)).

Let $R = (w, e, b)$ be the respective regions in which inequality is being decomposed (i.e. west, east or both), and $T = (A, B)$ be the two years during which changes in wage inequality are being decomposed. Also, let N be the number of individuals offered a wage and n be the number of individuals who chose not to participate in the labor market, and hence, for whom information on wages are unobserved. Consequently, $(N\text{-}n)$ will be the number of participants whose log-wages are observed.

[3] The Heckman Maximum Likelihood procedure is an equivalent alternative to the Generalized Selection Bias (GSB) approach introduced by Yun (1999), since both result in consistent, and asymptotically efficient and normally distributed estimators.

The equations for individual i's two latent variables, log-wages (Y_{RT}^*) and a selection (participation) variable (S_{RT}^*) developed by Heckman (1979) are:

$$Y_{RT}^* = X_{RT}\beta_{RT} + e_{RT} \dots (1)$$

$$S_{RT}^* = Z_{RT}\gamma_{RT} + v_{RT} > 0 \dots (2)$$

where X_{RT} is a $1 \times K_Y$ vector of socio-economic characteristics of individual i in region R in year T, including gender, education, tenure, potential experience, whether the individual is German, language proficiency, the industry in which the individual is employed, the size of the company in which the individual is employed, whether or not the individual works in an occupation he/she has been trained for and the individual's occupational position. Z_{RT} on the other hand, is a $1 \times K_S$ vector of socio-economic characteristics (instruments) of individual i in region R in year T, that explain the individual's participation decision. These instruments include age, gender, number of children, number of adult persons living in the individual's household, education and marital status. β_{RT} and γ_{RT} represent the $K_Y \times 1$ and $K_S \times 1$ vectors of coefficients respectively. e_{RT} and v_{RT} are the residuals of above log-wage and participation equations, such that $e_{RT} \sim N(0, \sigma_e^2)$, $v_{RT} \sim N(0, 1)$, and $E(e_{RT}v_{RT}) = \sigma_{ev}$[4]. S_{RT} is a binary variable which equals one if $S_{RT}^* > 0$, and zero otherwise. Also, observed log-wages equal Y_{RT}^* if $S_{RT} = 1$, and are missing if $S_{RT} = 0$.

The unconditional (population) expectation of log-wages is $E(Y_{RT}^*|X_{RT}) = X_{RT}\beta_{RT}$ since $E(e_{RT}) = 0$.

With selectivity issues however, the conditional expectation of log-wages given that the individual worker is selected into the sample is given by:

$$E(Y_{RT}^*|X_{RT}, S_{RT} = 1) = X_{RT}\beta_{RT} + E(e_{RT}|S_{RT} = 1) \dots (3)$$

where $E(e_{RT}|S_{RT} = 1) = \theta_{RT}\lambda_{RT} = \Lambda_{RT}$ and $\theta_{RT} = {}^{\sigma_{ev}}/_{\sigma_v} = \rho_{ev}\sigma_e$ and

[4] $E(e_{GR}v_{GR}) = 0$ if the number of observations in the wage and participation estimations are not equal.

$$\lambda_{RT} = \left. \phi\left(-\frac{Z_{RT}\gamma_{RT}}{\sigma_v}\right) \middle/ 1 - \Phi\left(-\frac{Z_{RT}\gamma_{RT}}{\sigma_v}\right) \right.$$ (i.e. λ_{RT} is the inverse Mill's ratio).

Hence, Λ_{RT} is the selection bias of log-wages of individual *i* in region *R* in year *T*.

The log-likelihood for observation *RT* that will be maximized is given by the following function[5]:

$$l_{RT} = \begin{cases} w_{RT} ln\Phi\left\{\frac{Z_{RT}\gamma_{RT} + (Y_{RT} - X_{RT}\beta_{RT})\rho_{ev}/\sigma_e}{\sqrt{1-\rho_{ev}^2}}\right\} - \frac{w_{RT}}{2}\left(\frac{Y_{RT} - X_{RT}\beta_{RT}}{\sigma_e}\right)^2 - w_{RT} ln\left(\sqrt{2\pi}\sigma_e\right) & Y_{RT}\ is\ observed \\ w_{RT} ln\Phi(-Z_{RT}\gamma_{RT}) & Y_{RT}\ is\ not\ observed \end{cases} \quad \ldots(4)$$

where $\Phi(.)$ is the standard cumulative normal and w_{RT} is an optional weight[6] for observation *RT*.

Maximizing (4) will then result in the ML consistent and efficient estimators of the log-wages and selection equation ($\tilde{\beta}_{RT}, \tilde{\gamma}_{RT}$), the standard deviation of the residual of the log-wages equation (σ_e) and the correlation coefficient between e_{RT} and v_{RT} (ρ_{ev}).

Hence, equations (1) and (2) can be rewritten as follows, where (~) denotes the ML estimates.

$$Y_{RT} = X_{RT}\tilde{\beta}_{RT} + \tilde{e}_{RT} \ldots (5)$$

$$S_{RT} = Z_{RT}\tilde{\gamma}_{RT} + \tilde{v}_{RT} \ldots (6)$$

such that

$$\tilde{e}_{RT} = \tilde{\Lambda}_{RT} + \tilde{\varepsilon}_{RT}$$

$$E(\tilde{e}_{RT} | S_{RT} = 1) = E\left(\tilde{\Lambda}_{RT}\right)$$

$$E\left(\tilde{\varepsilon}_{RT} \middle| X_{RT}, \tilde{\Lambda}_{RT}, S_{RT} = 1\right) = 0$$

The general representation of equation (5) can easily be modified, such that the log-wage equation of individual *i* will be particular to a specific region in a specific year. Hence,

[5] See the Stata Base Reference Manual, Volume 1 A-J, Release 9, page 460.
[6] Weights will be used in all estimations in the empirical part of this article.

decomposing wage inequality in region $R=w$ between years A and B will proceed as follows:

Equation (5) can be rewritten as[7]:

$$Y_A = \tilde{\beta}_{0A} + \sum_{k=1}^{k=K-1} \tilde{\beta}_{kA} X_{kA} + \tilde{e}_A \quad \ldots (7)$$

$$Y_B = \tilde{\beta}_{0B} + \sum_{k=1}^{k=K-1} \tilde{\beta}_{kB} X_{kB} + \tilde{e}_B \quad \ldots (8)$$

where Y is the natural logarithm of real hourly wages, the X's represent the observable characteristics, the $\tilde{\beta}$'s are the ML consistent and efficient coefficients of the regressions and the $\tilde{e}$'s represent each regression's respective error term. A and B represent the chosen years of comparison.

Furthermore, two auxiliary equations will be constructed by substituting the coefficients of equation (8) into (7), and alternatively substituting the coefficients of equation (7) into (8), resulting in equations (9) and (10) below.

$$Y_1 = \tilde{\beta}_{0B} + \sum_{k=1}^{k=K-1} \tilde{\beta}_{kB} X_{kA} + \tilde{e}_A \quad \ldots (9)$$

$$Y_2 = \tilde{\beta}_{0A} + \sum_{k=1}^{k=K-1} \tilde{\beta}_{kA} X_{kB} + \tilde{e}_B \quad \ldots (10)$$

The estimation output of equations (7) and (8) will then be used to calculate the gross relative shares of each observable characteristic in the wage inequality in each year, and then to calculate how much the changes in those gross relative shares did contribute to changes in wage inequality from year A to year B.

According to Fields (2003), the gross relative share of a particular observable characteristic in wage inequality in a given year is computed as follows:

$$s_k = \frac{\sigma_{\tilde{\beta}_k X_{k,} Y}}{\sigma_Y^2} = \frac{\tilde{\beta}_k \sigma_{X_k} \rho_{X_{k,\ Y}}}{\sigma_Y} \ldots (11)$$

[7] Individual and regional subscripts have been suppressed for ease of representation.

where $\sigma_Y^2 = \sum_{k=1}^{k=K-1} \sigma_{\widetilde{\beta}_k X_{k,} Y} + \sigma_{\tilde{e},Y}$ [8] and $\rho_{X_{k,}\ Y} = \frac{\sigma_{X_{k,}Y}}{\sigma_{X_k}\sigma_Y}$ and $\sigma_{\widetilde{\beta}_k X_{k,}Y} = \tilde{\beta}_k \sigma_{X_{k,}Y}$

Hence, Field's decomposition represents the contribution of the change in the observable characteristic *k* to the change in wage inequality between years *A* and *B* by:

$$\pi_k(\sigma_Y^2) \equiv \frac{[s_{kB}\sigma_{YB}^2 - s_{kA}\sigma_{YA}^2]}{[\sigma_{YB}^2 - \sigma_{YA}^2]} \dots (12)$$

where

$$\sigma_{YB}^2 - \sigma_{YA}^2 = \sum_{k=1}^{k=K} [s_{kB}\sigma_{YB}^2 - s_{kA}\sigma_{YA}^2] \dots (13)$$

Note that $\pi_k(\sigma_Y^2)$ measures the *gross* influence of a change in characteristic *k* on the change in wage inequality, and tells nothing about how much of that influence is due to a characteristics effect, and how much of it is due to a coefficient effect. However, it is of particular importance in the context of this article to see the size of the coefficient effects, since as mentioned before, the coefficient effect of a non-productivity related observable characteristic (e.g. gender and being an immigrant or not) will be considered a signal of the presence of wage discrimination.

Therefore, I proceed by implementing the decomposition of Yun (2006), in which he weaves the Fields and JMP methodologies together as follows:

Given that *K* is actually the residual of each respective wage equation, Yun rewrites the difference in the variances of log-wages from (13) as follows:

$$\sigma_{YB}^2 - \sigma_{YA}^2 = \sum_{k=1}^{k=K-1} s_{kB}\sigma_{YB}^2 - \sum_{k=1}^{k=K-1} s_{kA}\sigma_{YA}^2 + (\sigma_{\tilde{e}B}^2 - \sigma_{\tilde{e}A}^2) \dots (14)$$

[8] Such that $\sigma_{\tilde{e},Y} \neq \sigma_{\tilde{e}}^2$. The equality of the covariance between the residuals and the independent variable and the variance of the residuals is a result that is valid under OLS, given that $e \sim N(0,\ \sigma_e^2)$.

Finally, by utilizing the constructed auxiliary log-wage equation (9) and simply adding and subtracting $\sum_{k=1}^{k=K-1} s_{kY1}\sigma_{Y1}^2$ we arrive at Yun's decomposition:

$$\sigma_{YB}^2 - \sigma_{YA}^2 = \sum_{k=1}^{k=K-1}(s_{kYB}\sigma_{YB}^2 - s_{kY1}\sigma_{Y1}^2) + \sum_{k=1}^{k=K-1}(s_{kY1}\sigma_{Y1}^2 - s_{kYA}\sigma_{YA}^2) + (\sigma_{\tilde{e}B,YB} - \sigma_{\tilde{e}A,YA}) \quad \dots (15)$$

Alternatively, it is possible to use the constructed auxiliary equation (10) by adding and subtracting $\sum_{k=1}^{k=K-1} s_{kY2}\sigma_{Y2}^2$ in order to arrive at a similar decomposition[9]:

$$\sigma_{YB}^2 - \sigma_{YA}^2 = \sum_{k=1}^{k=K-1}(s_{kY2}\sigma_{Y2}^2 - s_{kYA}\sigma_{YA}^2) + \sum_{k=1}^{k=K-1}(s_{kYB}\sigma_{YB}^2 - s_{kY2}\sigma_{Y2}^2) + (\sigma_{\tilde{e}B,YB} - \sigma_{\tilde{e}A,YA}) \quad \dots (16)$$

The first, second and last terms of expressions (15) and (16) represent the decomposition terms of the difference in the variance of log-wages between years *A* and *B*, namely; the characteristics, coefficient, and residual effects respectively.

[9] Expressions (15) and (16) are likely to show somewhat different values for each respective decomposition term. That is because (15) uses the coefficients of equation (8) as reference, whereas (16) uses the coefficients of equation (7), which have different values. In order to make sure that the aforementioned difference is not substantial and does not alter the qualitative inferences, I compute both and report the results of expression (16) in appendix C.

IV. EMPIRICAL RESULTS:

In all estimations, the signs and relative magnitudes of the coefficients are generally as expected. Gender has a positive influence on wages. The return to education is positive[10], and higher degrees earn higher wages. Potential experience has an inverted U-shape, indicating that returns to potential experience increase at a decreasing rate. Tenure and language proficiency have relatively low positive effects on wages. Among industries, the energy sector appears to pay the highest wages. Also, there are clear wage premiums at large businesses, as compared to small ones. Furthermore, workers who are employed in occupations they have been trained for, earn higher wages than those who do not and those who are in training or have no training at all. Regarding occupational position, blue collar workers are paid the lowest wages, whereas managerial positions earn the most, followed by qualified and highly qualified professionals.

IV.1. Decomposition of the Change in Wage Inequality during 1999 – 2006[11]:

From 1999 until 2002 wage inequality increased remarkably all over Germany as compared with the period directly after reunification 1990–1999. From 2002 until 2006 however, inequality stabilized with a tendency to decline. Yun (1999) Gang and Yun (2003) and Gang et al. (2006) show that changes in inequality, as measured by the difference in the variance of log-wages during 1990–2000 was caused by changes in the coefficients and the residuals, and that the characteristics effect was negligible. In the following discussion, I first decompose wage inequality during the two sub-periods 1999–2002 and 2002–2006 in the western region, the eastern region and in reunified Germany. Then I compare the two decompositions with each other, and highlight the difference between these decompositions and those of the previous articles of Yun (1999), Gang and Yun (2003) and Gang et al. (2006).

[10] The signs of the education dummies, as shown in the tables of appendix B, are negative because the reference group id "University" that has the highest return. When education was included in the estimations as a continuous variable measured by the number of years, its coefficients were, as expected, all positive.

[11] The analysis in this section is based on expression (15) which uses the auxiliary equation (9) in decomposing the change in the variance of log-wages into a characteristics effect, coefficient effect and residual effect.

IV.1.1. Changes in Wage Inequality in the Western Region during 1999 – 2002:

The first two columns of table 4 represent each variable's share in the wage inequality in 1999 and 2002 respectively. The third column represents the Fields (2003) decomposition of the change in wage inequality into the gross relative shares of each explanatory variable. The fourth and sixth columns represent the Yun (2006) decomposition of each variable's gross relative share in the change in wage inequality into a characteristics effect and a coefficient effect[12]. The residual effect is reported in the bottom row of the table[13]. The fifth and seventh columns report the percentage of each effect in the change in wage inequality.

As shown in table (4), the change in wage inequality as measured by the difference in the variance of log-wages was 0.066 log points.

Measured by Fields (2003) gross relative shares, the main contributors to the increasing wage inequality were potential experience, the occupation/training match of workers tenure, and the distribution of occupational positions, whose contributions were 30.6%, 20.1%, 8.6% and 5.8% respectively.

The decomposition of Yun (2006) clearly confirms the above gross relative shares. That is, 43.29% of the increase in wage inequality was caused by changes in the characteristics of wage earners, and only 18.89% was caused by changes in the coefficients. The residuals accounted for 37.82%. The characteristics effect was mainly represented by changes in potential experience, the occupation/ training match of workers, and the distribution of the occupational positions, whose contributions to the change in wage inequality were 15.59%, 11.75% and 11.72% respectively. The coefficient effects on the other hand, were mainly due to increases in the variances of the returns to potential experience, the occupation/ training match and tenure, whose contributions were 15.00%, 8.38% and 7.02% respectively.

[12] For each variable, the value in the third column is equal to the sum of the values in the fourth and sixth columns, divided by the difference in the variance of log wages ($\pi(\sigma^2)$ = [Char. Eff. + Coeff. Eff.] /ΔVLOG). Any difference that might appear between this computation and the values reported in the tables is due to rounding discrepancies.

[13] Tables 4-9 are organized and interpreted similarly.

Table 4: Decomposition of Wage Inequality in the Western Region during 1999 – 2002

Δ VLOG = 0.066							
	Fields (2003)			Yun (2006)			
Variable	s_{k99}	s_{k02}	$\pi(\sigma^2)$	**Char. Eff.**	**%**	**Coeff. Eff.**	**%**
Gender	**0.064**	**0.038**	**-0.041**	**-0.001**	**-0.967**	**-0.002**	**-3.163**
Elementary School	0.006	0.004	-0.003	-0.001	-2.133	0.001	1.845
Secondary School 1	0.020	0.009	-0.023	0.001	2.145	-0.003	-4.428
Secondary School 2	0.029	0.031	0.040	0.001	1.266	0.002	2.699
High - School	-0.001	0.004	0.017	0.001	1.379	0.000	0.336
Education	**0.054**	**0.048**	**0.031**	**0.002**	**2.656**	**0.000**	**0.451**
Tenure	**0.023**	**0.038**	**0.086**	**0.001**	**1.602**	**0.005**	**7.024**
Potential Experience	0.102	0.242	0.671	0.019	29.046	0.025	38.060
$(\text{Potential Experience})^2/100$	-0.066	-0.140	-0.365	-0.009	-13.458	-0.015	-23.057
Potential Experience	**0.036**	**0.103**	**0.306**	**0.010**	**15.589**	**0.010**	**15.003**
Native	**-0.004**	**-0.002**	**0.006**	**0.000**	**0.472**	**0.000**	**0.156**
Speaks Only or Mostly Lang. of Origin	0.001	-0.001	-0.005	0.000	0.389	-0.001	-0.896
Speaks Both Languages Equal Frequently	0.005	0.001	-0.013	0.000	-0.154	-0.001	-1.102
Speaks Mostly German	0.001	0.000	-0.003	0.000	-0.185	0.000	-0.095
Language Proficiency	**0.007**	**0.000**	**-0.020**	**0.000**	**0.049**	**-0.001**	**-2.093**
Mining	0.000	0.000	-0.001	0.000	-0.190	0.000	0.072
Manufacturing	-0.001	-0.001	-0.001	0.000	0.626	0.000	-0.716
Construction	-0.001	-0.001	-0.001	0.001	1.211	-0.001	-1.310
Trade	0.037	0.018	-0.042	0.000	-0.660	-0.002	-3.539
Transportation	0.002	0.004	0.009	-0.001	-1.227	0.001	2.099
Banking and Insurance	-0.002	-0.004	-0.012	-0.001	-0.824	0.000	-0.340
Service	-0.008	-0.004	0.007	0.000	-0.728	0.001	1.399
Industry	**0.027**	**0.010**	**-0.041**	**-0.001**	**-1.793**	**-0.002**	**-2.335**
Between 20 and 200	-0.006	-0.005	-0.002	0.000	0.575	-0.001	-0.811
Between 200 and 2000	0.004	0.012	0.037	0.000	0.214	0.002	3.441
More than 2000	0.044	0.033	0.002	0.001	1.422	-0.001	-1.271
Company Size	**0.042**	**0.040**	**0.036**	**0.001**	**2.212**	**0.001**	**1.359**
Doesn't Work in Occupation Trained For	0.007	0.002	-0.014	0.000	0.036	-0.001	-1.472
No Training	0.025	0.072	0.216	0.008	11.715	0.007	9.854
Occupation/Training	**0.032**	**0.074**	**0.201**	**0.008**	**11.751**	**0.006**	**8.381**
White Collar	-0.007	-0.006	-0.006	0.001	0.829	-0.001	-1.396
Civil Service	0.018	0.011	-0.010	0.000	0.400	-0.001	-1.353
Qualified and Highly Qual. Professional	0.082	0.082	0.085	0.005	6.901	0.001	1.606
Forman	0.002	0.001	-0.003	0.000	-0.283	0.000	0.006
Managerial	0.028	0.019	-0.009	0.003	3.873	-0.003	-4.760
Occupational Position	**0.123**	**0.107**	**0.058**	**0.008**	**11.719**	**-0.004**	**-5.897**
Residual			**0.378**				
Total			**1.000**	**0.029**	**43.289**	**0.013**	**18.886**
				Residual		**0.025**	**37.824**

Source: Author

IV.1.2. Changes in Wage Inequality in the Eastern Region during 1999 – 2002:

Interestingly, table (5) shows that the increase in wage inequality in the eastern region was 0.073 log points, which is 0.007 log point higher than the inequality in the western region for he same period. In fact, not only did wage inequality change in the eastern region by more than it did in the west after 1999, but as shown before, the levels of inequality were actually higher in the east than the levels in the western region. This indicates that by 1999, the wage structure in the former socialist East Germany has fully converged into a less compressed market-oriented structure.

Measured by Fields (2003) gross relative shares, the main contributors to the increasing wage inequality were the occupation/training match of workers, the distribution by company size, education, occupational position and potential experience, whose contributions were 22.8%, 13.2%, 7.3%, 4.8% and 3.9% respectively.

According to the Yun (2006) decomposition, 38.84% of the increase in wage inequality was caused by changes in the characteristics of workers, and 22.85% was caused by changes in the coefficients. The residuals accounted for 38.32%. This shows that the coefficient effect, which in addition to the residual effect reflects changes in the wage structure, plays a more important role in the change in wage inequality in the eastern region than it does in the western region of reunified Germany.

The characteristics effect was mainly represented by changes in the occupation/ training match of workers, the distribution of the occupational positions, potential experience, education, and company size, whose contributions to the change in wage inequality were 14.04%, 7.58%, 6.99%, 3.67% and 3.51% respectively. The coefficient effects on the other hand, was mainly due to increases in variances of the returns to company size, the occupation/ training match, education and gender, whose contributions were respectively 9.70% 8.79%, 3.60% and 3.29%. Again, both Fields (2003) and Yun (2006) decompositions yield considerably confirming results.

Table 5: Decomposition of Wage Inequality in the Eastern Region during 1999 – 2002

Δ VLOG = 0.073							
	Fields (2003)			**Yun (2006)**			
Variable	s_{k99}	s_{k02}	$\pi(\sigma^2)$	**Char. Eff.**	**%**	**Coeff. Eff.**	**%**
Gender	**-0.003**	**0.008**	**0.036**	**0.000**	**0.264**	**0.002**	**3.294**
Elementary School	0.007	0.000	-0.017	0.000	-0.022	-0.001	-1.696
Secondary School 1	0.016	0.007	-0.015	0.000	-0.258	-0.001	-1.226
Secondary School 2	0.037	0.054	0.097	0.002	3.266	0.005	6.415
High - School	-0.007	-0.003	0.008	0.000	0.686	0.000	0.109
Education	**0.053**	**0.058**	**0.073**	**0.003**	**3.672**	**0.003**	**3.602**
Tenure	**0.009**	**0.013**	**0.022**	**0.001**	**0.914**	**0.001**	**1.318**
Potential Experience	0.039	0.101	0.262	0.016	21.735	0.003	4.458
(Potential Experience)^2/100	0.003	-0.059	-0.222	-0.011	-14.743	-0.005	-7.506
Potential Experience	**0.042**	**0.041**	**0.039**	**0.005**	**6.993**	**-0.002**	**-3.049**
Mining	0.001	0.001	0.001	0.000	-0.346	0.000	0.460
Manufacturing	0.015	0.008	-0.011	0.000	0.178	-0.001	-1.251
Construction	0.015	0.019	0.030	0.002	2.739	0.000	0.244
Trade	0.066	0.050	0.008	0.002	2.731	-0.001	-1.963
Transportation	-0.008	-0.002	0.014	0.001	1.465	0.000	-0.046
Banking and Insurance	-0.001	-0.003	-0.006	0.000	0.395	-0.001	-1.011
Service	-0.050	-0.035	0.003	-0.004	-5.300	0.004	5.580
Industry	**0.038**	**0.038**	**0.039**	**0.001**	**1.862**	**0.001**	**2.014**
Between 20 and 200	-0.004	-0.009	-0.024	0.001	1.121	-0.003	-3.479
Between 200 and 2000	0.047	0.062	0.102	0.004	5.130	0.004	5.072
More than 2000	0.068	0.064	0.054	-0.002	-2.744	0.006	8.106
Company Size	**0.112**	**0.117**	**0.132**	**0.003**	**3.507**	**0.007**	**9.699**
Doesn't Work in Occupation Trained For	0.011	0.001	-0.024	-0.001	-1.740	-0.001	-0.706
No Training	0.002	0.072	0.253	0.011	15.782	0.007	9.496
Occupation/Training	**0.013**	**0.073**	**0.228**	**0.010**	**14.042**	**0.006**	**8.790**
White Collar	-0.009	-0.001	0.022	0.000	0.015	0.002	2.184
Civil Service	0.005	0.013	0.033	0.001	1.373	0.001	1.967
Qualified and Highly Qual. Professional	0.103	0.056	-0.067	0.005	6.511	-0.010	-13.191
Forman	0.003	0.000	-0.007	0.000	-0.059	0.000	-0.621
Managerial	0.006	0.023	0.066	0.000	-0.255	0.005	6.840
Occupational Position	**0.108**	**0.092**	**0.048**	**0.006**	**7.583**	**-0.002**	**-2.821**
Residual			**0.383**				
Total			**1.000**	**0.028**	**38.837**	**0.017**	**22.848**
					Residual	**0.028**	**38.315**

Source: Author

IV.1.3. Changes in Wage Inequality in Reunified Germany during 1999 – 2002:

As table (6) demonstrates, the 0.064 log points increase in wage inequality in reunified Germany decomposes in a similar way to that of the western region of the country. Such an observation is rather unsurprising, knowing that the western laws, institutions and market practices were directly transferred and applied to the east during the transition process to constitute the once again reunified Germany.

Measured by Fields (2003) gross relative shares, the main contributors to the increasing wage inequality were potential experience, the occupation/training match of workers, tenure, the occupational position and education, whose contributions were 25.8%, 20.9%, 7.9%, 7.0% and 4.8% respectively.

According to the Yun (2006) decomposition, 43.03% of the increase in wage inequality was caused by changes in the characteristics of workers, and 16.16% was caused by changes in the coefficients. The residuals accounted for 40.81%.

The characteristics effect was mainly represented by changes in the occupation/ training match of workers, potential experience, the distribution of the occupational positions and education, whose contributions to the change in wage inequality were 14.30%, 14.20%, 12.84% and 3.06% respectively. The coefficient effects on the other hand, were mainly due to increases in the variances of the returns to potential experience, the occupation/ training match, tenure and the company size, whose contributions were respectively 11.64%, 6.63%, 6.19% and 2.02%. Judged by the relative importance of each variable in explaining changes in wage inequality, both decompositions yield once again, remarkably confirming results.

Table 6: Decomposition of Wage Inequality in Reunified Germany during 1999 – 2002

Δ VLOG = 0.064							
	Fields (2003)			**Yun (2006)**			
Variable	s_{k99}	s_{k02}	$\pi(\sigma^2)$	**Char. Eff.**	**%**	**Coeff. Eff.**	**%**
Gender	**0.047**	**0.032**	**-0.019**	**0.000**	**-0.490**	**-0.001**	**-1.368**
Elementary School	0.005	0.002	-0.005	-0.001	-1.216	0.000	0.723
Secondary School 1	0.013	0.006	-0.017	0.001	2.186	-0.002	-3.932
Secondary School 2	0.029	0.034	0.052	0.001	1.535	0.002	3.632
High - School	0.000	0.004	0.019	0.000	0.551	0.001	1.351
Education	**0.046**	**0.047**	**0.048**	**0.002**	**3.056**	**0.001**	**1.774**
Tenure	**0.024**	**0.036**	**0.079**	**0.001**	**1.703**	**0.004**	**6.192**
Potential Experience	0.089	0.196	0.562	0.017	27.211	0.018	28.997
$(\text{Potential Experience})^2/100$	-0.059	-0.114	-0.304	-0.008	-13.014	-0.011	-17.356
Potential Experience	**0.030**	**0.081**	**0.258**	**0.009**	**14.197**	**0.007**	**11.640**
Native	**0.000**	**-0.001**	**-0.003**	**0.000**	**-0.011**	**0.000**	**-0.240**
Speaks Only or Mostly Lang. of Origin	0.000	0.000	-0.003	0.000	0.134	0.000	-0.408
Speaks Both Languages Equal Frequently	0.002	0.000	-0.007	0.000	0.021	0.000	-0.684
Speaks Mostly German	0.000	0.000	0.001	0.000	-0.030	0.000	0.096
Language Proficiency	**0.002**	**0.000**	**-0.009**	**0.000**	**0.126**	**-0.001**	**-0.996**
Mining	0.000	0.000	0.000	0.000	0.047	0.000	-0.053
Manufacturing	-0.001	-0.001	0.001	0.001	1.073	-0.001	-0.947
Construction	-0.002	0.000	0.008	0.001	1.308	0.000	-0.507
Trade	0.038	0.020	-0.044	0.000	-0.187	-0.003	-4.211
Transportation	0.002	0.003	0.006	0.000	-0.546	0.001	1.148
Banking and Insurance	-0.004	-0.004	-0.007	-0.001	-0.884	0.000	0.153
Service	-0.010	-0.007	0.002	-0.001	-2.082	0.001	2.252
Industry	**0.023**	**0.010**	**-0.034**	**-0.001**	**-1.272**	**-0.001**	**-2.166**
Between 20 and 200	-0.009	-0.007	-0.003	0.000	0.692	-0.001	-0.965
Between 200 and 2000	0.012	0.019	0.044	0.000	0.088	0.003	4.285
More than 2000	0.054	0.041	-0.001	0.001	1.195	-0.001	-1.300
Company Size	**0.057**	**0.053**	**0.040**	**0.001**	**1.974**	**0.001**	**2.020**
Doesn't Work in Occupation Trained For	0.009	0.002	-0.019	0.000	-0.087	-0.001	-1.779
No Training	0.017	0.065	0.228	0.009	14.389	0.005	8.403
Occupation/Training	**0.026**	**0.067**	**0.209**	**0.009**	**14.302**	**0.004**	**6.625**
White Collar	-0.007	-0.006	-0.002	0.000	0.463	0.000	-0.631
Civil Service	0.016	0.012	-0.003	0.001	0.811	-0.001	-1.063
Qualified and Highly Qual. Professional	0.078	0.076	0.070	0.005	7.992	-0.001	-0.962
Forman	0.002	0.000	-0.005	0.000	-0.278	0.000	-0.175
Managerial	0.022	0.019	0.008	0.002	3.856	-0.002	-3.007
Occupational Position	**0.111**	**0.102**	**0.070**	**0.008**	**12.844**	**-0.004**	**-5.837**
Region	**0.069**	**0.043**	**-0.049**	**-0.002**	**-3.396**	**-0.001**	**-1.486**
Residual			**0.408**				
Total			**1.000**	**0.027**	**43.032**	**0.010**	**16.157**
					Residual	**0.026**	**40.810**

Source: Author

IV.1.4. Changes in Wage Inequality in the Western Region during 2002 – 2006:

During this period wage inequality was relatively stable. As demonstrated by table (7), wage inequality decreased by only 0.008 log points. Measured by Fields (2003) gross relative shares, the main variables that contributed positively to the changes in wage inequality were education, gender, the worker's industry and company size. The respective gross relative shares of those variables were 106.9%, 52.8%, 49.7% and 43.6%. On the other hand, variables that contributed negatively to the change in wage inequality were potential experience, the occupation/training match and the worker's occupational position. These variables' gross relative shares were 104.6%, 95.3% and 3.6% respectively. According to the Yun (2006) decomposition, the total characteristics effect accounted negatively for 165.56% of the change in wage inequality, which was more than offset by the positive contribution of the coefficient effects of 224.08%. The residuals however, had a negative effect that accounted for 158.53%, which resulted in the aforementioned slight overall decrease in wage inequality in the west. The negative characteristics effect was mainly represented by changes in education, potential experience, the occupational position and company size, whose contributions to the change in wage inequality were 71.36%, 35.50%, 31.12% and 17.57% respectively. The positive coefficient effects on the other hand, were mainly due to increases in the variances of the returns to education, gender, company size, the worker's industry and occupational position, whose contributions were respectively 178.21%, 60.27%, 57.38%, 45.81%, and 27.54%. These characteristics and coefficient effects clearly explain Fields (2003) gross relative shares in the sense that; for those variables which had positive gross relative shares, any negative characteristics effects where outweighed by corresponding positive coefficient effects, and vice versa (e.g. the individual's education, company size and occupational position). Overall however, the negative characteristics and residual effects together dominated the positive influence of the coefficients. Therefore, what distinguishes the decomposition of wage inequality in the western region during this period from the period of 1999-2002, is that the characteristic effect has become negative, and that the wage structure showed a fair amount of stability, since the positive coefficient effect was partially offset by the negative residual effect.

Table 7: Decomposition of Wage Inequality in the Western Region during 2002 – 2006

Δ VLOG = -0.008							
	Fields (2003)			**Yun (2006)**			
Variable	s_{k02}	s_{k06}	$\pi(\sigma^2)$	**Char. Eff.**	**%**	**Coeff. Eff.**	**%**
Gender	**0.038**	**0.056**	**-0.528**	**-0.001**	**7.468**	**0.005**	**-60.270**
Elementary School	0.004	0.012	-0.244	0.000	3.799	0.002	-28.185
Secondary School 1	0.009	0.022	-0.397	-0.004	50.009	0.007	-89.713
Secondary School 2	0.031	0.047	-0.466	-0.001	13.902	0.005	-60.538
High - School	0.004	0.003	0.039	0.000	3.649	0.000	0.225
Education	**0.048**	**0.083**	**-1.069**	**-0.006**	**71.359**	**0.014**	**-178.21**
Tenure	**0.038**	**0.040**	**-0.014**	**-0.001**	**17.566**	**0.002**	**-18.942**
Potential Experience	0.242	0.173	2.450	-0.008	100.726	-0.012	144.317
(Potential Experience)^2/100	-0.140	-0.100	-1.404	0.005	-65.224	0.006	-75.205
Potential Experience	**0.103**	**0.073**	**1.046**	**-0.003**	**35.502**	**-0.006**	**69.112**
Native	**-0.002**	**-0.003**	**0.038**	**0.001**	**-8.335**	**-0.001**	**12.097**
Speaks Only or Mostly Lang. of Origin	-0.001	0.000	-0.020	0.000	-0.844	0.000	-1.147
Speaks Both Languages Equal Frequently	0.001	0.002	-0.059	0.000	0.533	0.001	-6.440
Speaks Mostly German	0.000	0.001	-0.036	0.000	-1.631	0.000	-1.953
Language Proficiency	**0.000**	**0.004**	**-0.115**	**0.000**	**-1.943**	**0.001**	**-9.540**
Mining	0.000	0.000	-0.007	0.000	-1.741	0.000	1.033
Manufacturing	-0.001	-0.006	0.157	-0.001	8.681	-0.001	7.063
Construction	-0.001	-0.003	0.054	-0.001	9.724	0.000	-4.326
Trade	0.018	0.045	-0.865	0.000	-3.067	0.007	-83.472
Transportation	0.004	0.002	0.059	-0.001	6.576	0.000	-0.643
Banking and Insurance	-0.004	-0.009	0.145	-0.001	8.219	-0.001	6.235
Service	-0.004	-0.003	-0.039	0.003	-32.235	-0.002	28.300
Industry	**0.010**	**0.026**	**-0.497**	**0.000**	**-3.842**	**0.004**	**-45.809**
Between 20 and 200	-0.005	-0.007	0.062	0.001	-6.215	-0.001	12.377
Between 200 and 2000	0.012	0.021	-0.273	0.002	-24.740	0.000	-2.609
More than 2000	0.033	0.041	-0.224	-0.004	44.715	0.005	-67.149
Company Size	**0.040**	**0.055**	**-0.436**	**-0.001**	**13.760**	**0.005**	**-57.382**
Doesn't Work in Occupation Trained For	0.002	0.002	0.006	0.000	5.413	0.000	-4.788
No Training	0.072	0.045	0.947	0.000	-2.512	-0.008	97.185
Occupation/Training	**0.074**	**0.047**	**0.953**	**0.000**	**2.902**	**-0.008**	**92.397**
White Collar	-0.006	-0.010	0.101	0.000	0.198	-0.001	9.934
Civil Service	0.011	0.008	0.107	-0.001	10.043	0.000	0.680
Qualified and Highly Qual. Professional	0.082	0.099	-0.438	0.002	-22.008	0.002	-21.789
Forman	0.001	0.005	-0.136	0.000	-3.092	0.001	-10.518
Managerial	0.019	0.007	0.401	-0.004	45.977	0.000	-5.843
Occupational Position	**0.107**	**0.109**	**0.036**	**-0.003**	**31.119**	**0.002**	**-27.536**
Residual			**1.585**				
Total			**1.000**	**-0.013**	**165.555**	**0.018**	**-224.08**
					Residual	**-0.013**	**158.529**

Source: Author

IV.1.5. Changes in Wage Inequality in the Eastern Region during 2002 – 2006:

As demonstrated by table (8), wage inequality in the eastern region was also relatively stable, increasing slightly however, by 0.019 log points.

Measured by Fields (2003) gross relative shares, variables that contributed positively to the changes in wage inequality were mainly education, potential experience, and tenure and company size. The respective gross relative shares of those variables were 108.6%, 51.3%, 28.5% and 27.5%. On the other hand, the workers industry was the only variable that had a negative gross relative contribution to wage inequality, equal to 30.3%.

According to the Yun (2006) decomposition, the total characteristics effect accounted negatively for 52.51% of the change in wage inequality, which was in turn more than offset by the positive contribution of the coefficient effects of 278.56%. Also, the residuals effect had a negative contribution of 126.06% which had partially offset the positive coefficient effect.

The negative characteristics effect was mainly represented by changes in potential experience, education and gender, whose contributions to the change in wage inequality were 36.55%, 27.58%, and 14.44% respectively. The positive coefficient effects on the other hand, were mainly due to increases in the variances of the returns to education, potential experience, gender, tenure, and the worker's occupational position, whose contributions were respectively 136.15%, 87.82%, 30.24%, 24.57% and 23.35%.

The two decompositions clearly reveal consistent results. Particularly, that the positive coefficient effects of education, potential experience and tenure outweighed their corresponding negative characteristics effects, leading to the aforementioned Fields (2003) gross relative shares. Nevertheless, the overall increase in wage inequality in the eastern region was –as mentioned- relatively small.

Table 8: Decomposition of Wage Inequality in the Eastern Region during 2002 – 2006

Δ VLOG = 0.019							
	Fields (2003)			**Yun (2006)**			
Variable	s_{k02}	s_{k06}	$\pi(\sigma^2)$	**Char. Eff.**	**%**	**Coeff. Eff.**	**%**
Gender	**0.008**	**0.018**	**0.158**	**-0.003**	**-14.441**	**0.006**	**30.242**
Elementary School	0.000	0.000	0.001	0.000	0.178	0.000	-0.123
Secondary School 1	0.007	0.043	0.542	0.000	-2.321	0.011	56.479
Secondary School 2	0.054	0.088	0.567	-0.005	-24.443	0.015	81.134
High - School	-0.003	-0.004	-0.023	0.000	-0.995	0.000	-1.342
Education	**0.058**	**0.127**	**1.086**	**-0.005**	**-27.580**	**0.025**	**136.148**
Tenure	**0.013**	**0.031**	**0.285**	**0.001**	**3.940**	**0.005**	**24.574**
Potential Experience	0.101	0.193	1.485	-0.015	-80.221	0.043	228.759
(Potential Experience)^2/100	-0.059	-0.120	-0.973	0.008	43.671	-0.026	-140.94
Potential Experience	**0.041**	**0.073**	**0.513**	**-0.007**	**-36.550**	**0.016**	**87.820**
Mining	0.001	0.000	-0.016	0.000	0.428	0.000	-2.004
Manufacturing	0.008	0.005	-0.035	-0.001	-5.061	0.000	1.583
Construction	0.019	0.000	-0.269	-0.002	-9.089	-0.003	-17.812
Trade	0.050	0.023	-0.353	-0.008	-44.401	0.002	9.117
Transportation	-0.002	0.005	0.095	0.001	6.031	0.001	3.457
Banking and Insurance	-0.003	-0.005	-0.041	0.000	-0.248	-0.001	-3.833
Service	-0.035	-0.012	0.315	0.010	54.480	-0.004	-22.943
Industry	**0.038**	**0.015**	**-0.303**	**0.000**	**2.141**	**-0.006**	**-32.435**
Between 20 and 200	-0.009	0.013	0.322	0.003	14.464	0.003	17.749
Between 200 and 2000	0.062	0.048	-0.150	0.000	0.095	-0.003	-15.047
More than 2000	0.064	0.067	0.102	0.001	5.053	0.001	5.147
Company Size	**0.117**	**0.128**	**0.275**	**0.004**	**19.613**	**0.001**	**7.849**
Doesn't Work in Occupation Trained For	0.001	0.012	0.168	0.001	4.000	0.002	12.762
No Training	0.072	0.061	-0.097	0.000	2.080	-0.002	-11.747
Occupation/Training	**0.073**	**0.073**	**0.071**	**0.001**	**6.081**	**0.000**	**1.015**
White Collar	-0.001	-0.007	-0.100	0.001	4.868	-0.003	-14.848
Civil Service	0.013	0.018	0.082	0.000	0.644	0.001	7.516
Qualified and Highly Qual. Professional	0.056	0.064	0.168	-0.001	-5.362	0.004	22.127
Forman	0.000	0.000	0.004	0.000	-0.823	0.000	1.239
Managerial	0.023	0.023	0.023	-0.001	-5.035	0.001	7.316
Occupational Position	**0.092**	**0.097**	**0.176**	**-0.001**	**-5.710**	**0.004**	**23.350**
Residual			**-1.261**				
Total			**1.000**	**-0.010**	**-52.506**	**0.052**	**278.563**
					Residual	**-0.024**	**-126.06**

Source: Author

IV.1.6. Changes in Wage Inequality in Reunified Germany during 2002 – 2006:

As table (9) demonstrates, the 0.002 log points decrease in wage inequality in reunified Germany decomposes, as expected, in an almost similar way to that of the western region of the country.

Measured by Fields (2003) gross relative shares, variables that have contributed positively to the change in wage inequality were education, gender, company size, the worker's industry and tenure. The respective gross relative shares of those variables were 543.4%, 251.2%, 234.8%, 184.2% and 51.0%. On the other hand, variables that contributed negatively to the change in wage inequality were the worker's occupation/training match and potential experience. These variables' gross relative shares were 321.4% and 244.7% respectively.

According to the Yun (2006) decomposition, the total characteristics effect accounted negatively for 1036.71% of the change in wage inequality, which was more than offset by the positive contribution of the coefficient effects of 1813.63%. The residual effect was negative and accounted for 876.92%.

The negative characteristics effect was mainly represented by changes in education, potential experience, occupational position, gender, tenure, company size, whose contributions to the change in wage inequality were 338.95%, 207.86%, 167.04%, 89.73%, 80.26% and 62.63% respectively. The positive coefficient effects on the other hand, was mainly due to increases in the variances of the returns to education, gender, company size, the worker's industry, occupational position and tenure, whose contributions were respectively 882.31%, 340.93%, 297.41%, 196.56%, 177.67%, and 131.25%.

Table 9: Decomposition of Wage Inequality in Reunified Germany during 2002 – 2006

Δ VLOG = -0.002							
	Fields (2003)			**Yun (2006)**			
Variable	s_{k02}	s_{k06}	$\pi(\sigma^2)$	**Char. Eff.**	**%**	**Coeff. Eff.**	**%**
Gender	**0.032**	**0.047**	**-2.512**	**-0.002**	**89.729**	**0.006**	**-340.93**
Elementary School	0.002	0.008	-0.920	0.000	0.086	0.002	-92.072
Secondary School 1	0.006	0.019	-2.107	-0.003	178.406	0.007	-389.15
Secondary School 2	0.034	0.050	-2.578	-0.002	132.350	0.007	-390.14
High - School	0.004	0.003	0.172	0.000	28.106	0.000	-10.951
Education	**0.047**	**0.080**	**-5.434**	**-0.006**	**338.947**	**0.015**	**-882.31**
Tenure	**0.036**	**0.040**	**-0.510**	**-0.001**	**80.261**	**0.002**	**-131.25**
Potential Experience	0.196	0.166	5.066	-0.009	518.076	0.000	-11.507
(Potential Experience)^2/100	-0.114	-0.099	-2.618	0.005	-310.21	-0.001	48.390
Potential Experience	**0.081**	**0.067**	**2.447**	**-0.004**	**207.863**	**-0.001**	**36.883**
Native	**-0.001**	**-0.001**	**0.054**	**0.000**	**-19.938**	**0.000**	**25.361**
Speaks Only or Mostly Lang. of Origin	0.000	0.000	-0.064	0.000	-2.131	0.000	-4.294
Speaks Both Languages Equal Frequently	0.000	0.001	-0.197	0.000	-2.081	0.000	-17.583
Speaks Mostly German	0.000	0.001	-0.092	0.000	-4.429	0.000	-4.792
Language Proficiency	**0.000**	**0.002**	**-0.353**	**0.000**	**-8.641**	**0.000**	**-26.670**
Mining	0.000	0.000	-0.017	0.000	-7.440	0.000	5.775
Manufacturing	-0.001	-0.006	0.889	-0.001	51.706	-0.001	37.225
Construction	0.000	-0.003	0.473	-0.001	61.336	0.000	-14.030
Trade	0.020	0.036	-2.624	-0.003	159.504	0.007	-421.93
Transportation	0.003	0.003	0.024	0.000	4.799	0.000	-2.414
Banking and Insurance	-0.004	-0.009	0.811	-0.001	32.673	-0.001	48.437
Service	-0.007	0.001	-1.399	0.005	-290.27	-0.003	150.375
Industry	**0.010**	**0.022**	**-1.842**	**0.000**	**12.311**	**0.003**	**-196.56**
Between 20 and 200	-0.007	-0.009	0.222	0.001	-44.015	-0.001	66.197
Between 200 and 2000	0.019	0.027	-1.361	0.002	-117.58	0.000	-18.500
More than 2000	0.041	0.049	-1.209	-0.004	224.219	0.006	-345.11
Company Size	**0.053**	**0.067**	**-2.348**	**-0.001**	**62.630**	**0.005**	**-297.41**
Doesn't Work in Occupation Trained For	0.002	0.003	-0.141	0.000	27.559	0.001	-41.671
No Training	0.065	0.045	3.355	0.001	-30.827	-0.006	366.306
Occupation/Training	**0.067**	**0.048**	**3.214**	**0.000**	**-3.268**	**-0.006**	**324.636**
White Collar	-0.006	-0.010	0.714	0.000	-13.384	-0.001	84.815
Civil Service	0.012	0.010	0.415	-0.001	61.912	0.000	-20.451
Qualified and Highly Qual. Professional	0.076	0.091	-2.444	0.002	-119.35	0.002	-125.03
Forman	0.000	0.003	-0.476	0.000	-14.394	0.001	-33.253
Managerial	0.019	0.009	1.685	-0.004	252.254	0.001	-83.746
Occupational Position	**0.102**	**0.103**	**-0.106**	**-0.003**	**167.044**	**0.003**	**-177.67**
Region	**0.043**	**0.045**	**-0.379**	**-0.002**	**109.772**	**0.003**	**-147.71**
Residual			**8.769**				
Total			**1.000**	**-0.018**	**1036.7**	**0.031**	**-1813.6**
					Residual	**-0.015**	**876.924**

Source: Author

IV.2. Decompositions Compared:

It is clear from the previous decompositions that both the Fields (2003) and Yun (2006) methodologies yield confirming results. Of course, one would not expect otherwise since the Fields (2003) decomposition is by construction a component of the Yun (2006) decomposition. However, as Fields (2003) provides the gross relative shares of each variable in the difference in the variance of log-wages, Yun (2006) further decomposes those shares into characteristics and coefficient effects.

The above decompositions reveal the interesting result that during the period 1999-2002 each of the characteristics effect, coefficient effect and residual effect contributed positively to the increasing levels of wage inequality in the western region, eastern region and reunified Germany. On the other hand, the relative stability in wage inequality during the period 2002-2006 was caused by the fact that the characteristics effect and the residual effect influenced wage inequality negatively, whereas the coefficient effect maintained a positive influence on wage inequality in both the western region, eastern region and in reunified Germany alike. Nevertheless, the positive impact of the coefficient effect in the east during 2002-2006 was strong enough to ensure the continuity in the increasing trend of wage inequality, though at a much slower pace compared to the period 1999-2002.

A better understanding of the evolution of wage inequality in Germany after reunification however, requires us to read the results of the decompositions in this article in sequence, after the results of Yun (1999), Gang and Yun (2003) and Gang et al. (2006)[14]. In their articles, they come to the conclusion that changes in wage inequality in the east during 1990-2000 were almost entirely explained by the coefficient and residual effects (i.e. by the wage structure), whereas the characteristics effect was negligible. Wage inequality in the west on the other hand remained relatively stable. This result is rather unsurprising, since one would expect that the transition process of the east into a market economy first affects prices and results in a less compressed wage structure, which will in turn be

[14] These articles address changes in wage growth and inequality for men in former East Germany, while this article includes both genders and addresses changes in wage inequality in the east and the west separately and then in reunified Germany. Therefore, one should be aware of these differences while comparing those articles' results.

reflected in wage growth and increasing wage inequality. It is natural that it took more time for the transition to start influencing the characteristics of workers. And that explains why the characteristics effect remained negligible in explaining any of the changes in wage inequality in the eastern region of reunified Germany during the first decade after reunification.

From 1999 until 2002 however, it is obvious that the characteristics effect, along with changes in the wage structure, played a crucial role in explaining the increasing wage inequality. That means that it took the transition process approximately 10 years to start having an influence on the characteristics of workers in the east, and as a matter of fact, in the west too. I argue that workers characteristics were even affected by the initial influence of the transition on the wage structure. For example, the increase that happened to wages in the east directly after reunification is expected to have had a positive influence on characteristics like education and tenure, and even on workers participation decisions. This provides another reason to believe that the first to be affected by the transition process are prices and wages, and then characteristics will follow. And that is exactly the story that the decompositions of Yun (1999), Gang and Yun (2003) and Gang et al. (2006) and those of this article tell.

Furthermore, during 2002-2006 the influence of the transition process on both the characteristics effect and the wage structure (the sum of the coefficient and residual effects) has declined, which resulted in the relatively stable wage inequality in the eastern region, the western region and in reunified Germany. Therefore, I believe that the influence of the transition of the east into a market oriented economy on wage inequality has started by significantly affecting the wage structure in the east during the first decade, then wage inequality increased in both the western region and the eastern region due to the strong characteristics effect which was reinforced by the continuing change in the wage structure. After that, wage inequality slowed down and stabilized due to the decreases in the characteristics effect and a more stable wage structure.

Finally, it is worth taking a closer look at the paper of Gernandt and Pfeiffer (2007) in light of the results of this article. As mentioned before, in their paper they use, though not identical, a fairly similar sample. Their *full* sample contains all workers aged 16 to 65

including both genders and the self-employed, and the upper and lower 2% of the wage distribution are trimmed. The period of their sample that is of great relevance to the findings in this article is the one from 1994 to 2005. They implement the JMP decomposition methodology and decompose changes in wage inequality into a characteristics, price and residual effect in both West Germany and East Germany. They find that wage inequality was fairly stable with a tendency to decrease during 1984-1994, and then increased during 1994-2005. For West Germany the residual explained approximately two thirds of the change in wage inequality, whereas it explained 40% of wage inequality in East Germany. In the West, inequality occurred primarily within the group of workers with lower tenure, whereas in the East, a large part of the change in inequality was experienced among the group of high wage workers in the upper tail of the wage distribution. They explain that result by competition between both regions of Germany for high wage workers, who would migrate to the west if not paid sufficiently high in the eastern part of the country.

These results are very interesting. However, the methodology implemented in their analysis does not allow for further decomposing each of the characteristics and price effects into relative shares of each variable. Furthermore, the residual effects in their decompositions were relatively high, which I attribute to that their original regressions include only the variables of gender, education, tenure, potential experience, self employment and nationality, and do not include other relevant variables, such as workers' industries, company sizes and occupational position, whose effects will then be captured by the residuals, leading to a biased residual effect. In their case, I believe that it was overstated. Also, although not explicitly stated in their paper, if their regressions where estimated via OLS, it is likely that their coefficients are biased due to selection.

Hence, the decompositions in this article complement the findings of Gernandt and Pfeiffer (2007) in the sense that they provide more details about the particular characteristics and coefficient effects of each variable, and include more variables and control for participation decision. As a result, the residual effects in the decompositions for the period 1999-2002, which is the period when most of the increase in wage

inequality in both regions occurred, accounted only for 38%[15]. On the other hand the finding of this article that the characteristics and the residual effects both contributed to the rising wage inequality in Germany confirms the findings of Gernandt and Pfeiffer. Nevertheless, unlike reported in their paper, I believe that the characteristics effect at least during 1999-2002 played a larger role in the increasing wage inequality in both regions, than the coefficient effect did. Furthermore, while Gernandt and Pfeiffer (2008) did not specify precisely when wage inequality in the east converged to the levels in the west, it is quite unambiguous that convergence took place in 1999/2000.

V. CONCLUSIONS:

The conclusions of this article could be summarized by the following. During 1999-2002 wage inequality increased by 32.80% in the western region and by 38.41% in the east. This caused a 29.11% increase in wage inequality in reunified Germany. During 2002-2006 on the other hand, wage inequality was relatively stable in both regions; decreasing by 3.03% in the west and increasing in the east by 7.14%. That caused a negligible decrease in wage inequality in reunified Germany by 0.60%.

I use data from the German Socio-Economic Panel for the two sub-periods 1999-2002 and 2002-2006, and implement the decomposition methodologies of Fields (2003) and Yun (2006) to investigate the main socio-economic variables that explain the increasing wage inequality in the first period, and to analyze what happened to those variables in the period that followed for wage inequality to stabilize. Furthermore, I describe how changes in the gross relative shares of these socio-economic variables during each period decompose into changes that are due to changes in workers' labor market characteristics, changes that are due to changes in the returns to those characteristics and changes that are due to changes in the residuals.

I find that during 1999-2006, potential experience, education, workers' occupation/training match, tenure and company size were the most consistent in their

[15] The residual effect was even smaller (21% in the west and 5% in the east) in the decompositions for the whole period 1999-2006. These decompositions are available upon request.

gross relative shares at explaining changes in wage inequality in both the western and eastern regions of reunified Germany, whereas the shares of workers' occupational positions, gender, being native, language proficiency and industry were less consistent.

During the period 1999-2002 each of the characteristics effect, coefficient effect and residual effect contributed positively to the increasing levels of wage inequality in the western region, eastern region and reunified Germany. On the other hand, the relative stability in wage inequality during the period 2002-2006 was caused by fact that the characteristics effect and the residual effect influenced wage inequality negatively, whereas the coefficient effect maintained a positive influence on wage inequality in both the western region, eastern region and in reunified Germany alike.

During 1999-2002 changes in the variances of the returns to gender contributed negatively by 3.16% to changes in wage inequality in the west, and positively by 3.29% in the east. Also, during 2002-2006, changes in the variances of the returns to gender contributed negatively by 60.27% to changes in wage inequality in the west, and positively by 30.24% in the east. On the other hand, both the characteristics effect and coefficient effect of a worker being native or foreign were negligible. This indicates that the decompositions provide a signal for the presence of gender discrimination in Germany, whereas a similar kind of signal for discrimination against immigrants can not be found.

To summarize, the results of the decompositions of wage inequality in the eastern region, western region and reunified Germany indicate that after a decade of transition into a market economy, wage inequality in the east is governed by he same rules that prevail in the west, with possible interchanges between the directions and magnitudes of some variables' characteristics and coefficient effects. Furthermore, in comparison with the period directly following the reunification, after 1999 wage inequality can be explained by both; changes in workers characteristics and changes in the wage structure, and not by changes in the wage structure alone.

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APPENDIX A:

Means of Real Hourly Wages and Inequality Measures:

Table 10: Real Hourly Wages and Inequality Measures in the Western Region

Year	Wage	VLOG	CV	GINI	THEIL	PERCENTILE RATIO
1993	13.958	0.185	0.382	0.203	0.071	0.902
	(100.000)	(100.000)	(100.000)	(100.000)	(100.000)	(100.000)
1994	14.122	0.189	0.391	0.209	0.075	0.956
	(101.170)	(102.310)	(102.503)	(102.876)	(105.314)	(105.927)
1995	14.222	0.180	0.402	0.213	0.078	0.959
	(101.888)	(97.406)	(105.198)	(104.814)	(109.596)	(100.319)
1996	14.386	0.210	0.418	0.220	0.083	0.954
	(103.064)	(113.302)	(109.561)	(108.171)	(116.950)	(99.500)
1997	14.266	0.201	0.408	0.216	0.079	0.970
	(102.202)	(108.391)	(106.802)	(106.250)	(111.586)	(101.689)
1998	14.144	0.197	0.407	0.216	0.079	0.987
	(101.332)	(106.640)	(106.547)	(106.566)	(111.222)	(101.720)
1999	14.394	0.202	0.415	0.219	0.082	0.988
	(103.124)	(109.256)	(108.807)	(107.868)	(115.205)	(100.126)
2000	14.176	0.245	0.444	0.241	0.098	1.155
	(101.558)	(132.682)	(116.388)	(118.578)	(138.074)	(116.877)
2001	14.220	0.280	0.457	0.249	0.103	1.206
	(101.878)	(151.298)	(119.738)	(122.414)	(145.930)	(104.429)
2002	14.539	0.268	0.477	0.258	0.110	1.231
	(104.163)	(145.091)	(124.848)	(126.835)	(155.780)	(102.108)
2003	14.679	0.272	0.476	0.258	0.111	1.253
	(105.165)	(147.030)	(124.675)	(127.242)	(156.641)	(101.744)
2004	14.714	0.285	0.474	0.259	0.111	1.305
	(105.416)	(154.124)	(124.166)	(127.474)	(156.250)	(104.161)
2005	14.435	0.309	0.483	0.263	0.114	1.308
	(103.413)	(166.976)	(126.492)	(129.336)	(161.445)	(100.279)
2006	14.664	0.260	0.469	0.255	0.107	1.241
	(105.057)	(140.701)	(122.883)	(125.563)	(151.524)	(94.835)

1. Hourly Wages are in Constant 2001 Euros
2. VLOG, CV, GINI, THEIL and PERCENTILE RATIO are the variance of log-wages, the coefficient of variation, the Gini coefficient, the Theil entropy index given by $1/n \sum_{i=1}^{n} (Y_i/\mu_Y) log(Y_i/\mu_Y)$, where Y_i, μ_Y and n are the wage level, mean wages and number of observations respectively, and the $90^{th} - 10^{th}$ percentile difference in log-wages.
3. The standardized measure of inequality (1993 = 100) is reported between parentheses.
4. The calculation of the VLOG includes weights.

Table 11: Real Hourly Wages and Inequality Measures in the Eastern Region

Year	Wage	VLOG	CV	GINI	THEIL	PERCENTILE RATIO
1993	9.717	0.178	0.358	0.198	0.065	0.930
	(100.000)	(100.000)	(100.000)	(100.000)	(100.000)	(100.000)
1994	9.624	0.171	0.354	0.195	0.063	0.903
	(99.037)	(95.677)	(98.884)	(98.355)	(96.325)	(97.153)
1995	9.740	0.181	0.378	0.207	0.071	0.973
	(100.232)	(101.536)	(105.652)	(104.753)	(109.171)	(107.712)
1996	9.874	0.194	0.374	0.205	0.069	0.967
	(101.609)	(108.573)	(104.684)	(103.780)	(106.608)	(99.409)
1997	9.704	0.191	0.393	0.213	0.075	0.976)
	(99.863)	(107.315)	(109.774)	(107.673)	(115.606)	(100.899
1998	9.941	0.212	0.394	0.214	0.076	0.979
	(102.296)	(118.700)	(110.113)	(108.092)	(117.275)	(100.390)
1999	10.076	0.189	0.402	0.217	0.078	1.008
	(103.693)	(105.888)	(112.345)	(109.730)	(119.841)	(102.914)
2000	9.765	0.276	0.451	0.248	0.101	1.231
	(100.493)	(154.687)	(126.080)	(125.238)	(155.688)	(122.113)
2001	10.227	0.290	0.466	0.257	0.109	1.253
	(105.245)	(162.358)	(130.340)	(129.828)	(166.644)	(101.791)
2002	10.595	0.261	0.509	0.270	0.121	1.285
	(109.027)	(146.556)	(142.246)	(136.540)	(186.206)	(102.548)
2003	10.784	0.293	0.497	0.266	0.118	1.261
	(110.973)	(164.354)	(138.948)	(134.694)	(181.001)	(98.163)
2004	11.023	0.289	0.491	0.267	0.116	1.265
	(113.437)	(162.029)	(137.303)	(135.080)	(178.787)	(100.332)
2005	10.836	0.295	0.503	0.270	0.119	1.277
	(111.514)	(165.557)	(140.768)	(136.735)	(182.797)	(100.901)
2006	10.688	0.280	0.488	0.266	0.113	1.268
	(109.991)	(157.016)	(136.470)	(134.569)	(173.927)	(99.342)

1. Hourly Wages are in Constant 2001 Euros
2. VLOG, CV, GINI, THEIL and PERCENTILE RATIO are the variance of log-wages, the coefficient of variation, the Gini coefficient, the Theil entropy index given by $1/n \sum_{i=1}^{n} (Y_i/\mu_Y) log(Y_i/\mu_Y)$, where Y_i, μ_Y and n are the wage level, mean wages and number of observations respectively, and the $90^{th} - 10^{th}$ percentile difference in log-wages.
3. The standardized measure of inequality (1993 = 100) is reported between parentheses.
4. The calculation of the VLOG includes weights.

Table 12: Real Hourly Wages and Inequality Measures in the Reunified Germany

Year	Wage	VLOG	CV	GINI	THEIL	PERCENTILE RATIO
1993	13.153	0.203	0.406	0.217	0.080	1.020
	(100.000)	(100.000)	(100.000)	(100.000)	(100.000)	(100.000)
1994	13.247	0.208	0.415	0.223	0.083	1.037
	(100.718)	(102.118)	(102.350)	(102.508)	(104.185)	(101.683)
1995	13.349	0.203	0.426	0.227	0.087	1.054
	(101.495)	(99.681)	(104.957)	(104.497)	(108.889)	(101.603)
1996	13.462	0.228	0.438	0.231	0.090	1.058
	(102.352)	(112.286)	(107.881)	(106.244)	(113.000)	(100.415)
1997	13.365	0.222	0.435	0.231	0.089	1.075
	(101.618)	(109.015)	(107.203)	(106.437)	(112.392)	(101.625)
1998	13.330	0.220	0.431	0.230	0.088	1.068
	(101.349)	(108.020)	(106.319)	(105.935)	(110.976)	(99.304)
1999	13.584	0.218	0.440	0.233	0.091	1.064
	(103.279)	(107.363)	(108.382)	(107.312)	(114.307)	(99.617)
2000	13.330	0.274	0.469	0.255	0.108	1.243
	(101.349)	(134.902)	(115.574)	(117.296)	(135.678)	(116.869)
2001	13.455	0.299	0.481	0.262	0.114	1.289
	(102.302)	(147.026)	(118.517)	(120.538)	(142.621)	(103.719)
2002	13.829	0.282	0.501	0.270	0.121	1.305
	(105.145)	(138.619)	(123.581)	(124.568)	(151.813)	(101.207)
2003	13.985	0.291	0.498	0.269	0.120	1.313
	(106.329)	(143.054)	(122.657)	(124.133)	(150.797)	(100.595)
2004	14.036	0.299	0.495	0.270	0.120	1.333
	(106.716)	(146.894)	(122.072)	(124.388)	(150.205)	(101.532)
2005	13.832	0.318	0.502	0.273	0.122	1.355
	(105.167)	(156.532)	(123.862)	(125.707)	(153.538)	(101.664)
2006	13.958	0.280	0.490	0.267	0.116	1.308
	(106.122)	(137.783)	(120.838)	(122.818)	(145.782)	(96.551)

1. Hourly Wages are in Constant 2001 Euros
2. VLOG, CV, GINI, THEIL and PERCENTILE RATIO are the variance of log-wages, the coefficient of variation, the Gini coefficient, the Theil entropy index given by $1/n \sum_{i=1}^{n} (Y_i/\mu_Y) log(Y_i/\mu_Y)$, where Y_i, μ_Y and n are the wage level, mean wages and number of observations respectively, and the $90^{th} - 10^{th}$ percentile difference in log-wages.
3. The standardized measure of inequality (1993 = 100) is reported between parentheses.
4. The calculation of the VLOG includes weights.

APPENDIX B:

Regression Results:

Table 13: Log–Wages and Participation Equations 1999

Log - Wage Equation						
Region	West		East		Both	
Number of Observations	2918		1167		4085	
Censored Observations	192		62		254	
Likelihood Ratio Test ($\rho = 0$): (Prob > $\chi 2$)	0.000		0.000		0.000	
Log Likelihood	-1649.586		-623.976		-2334.539	
Variable	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Constant	2.200***	0.080	1.889***	0.103	1.947***	0.070
Gender	0.227***	0.017	0.113***	0.026	0.201***	0.014
Elementary School	-0.153***	0.046	-0.374***	0.121	-0.168***	0.041
Secondary School 1	-0.203***	0.032	-0.328***	0.082	-0.199***	0.029
Secondary School 2	-0.160***	0.019	-0.124***	0.032	-0.155***	0.016
High - School	-0.032	0.038	-0.071*	0.037	-0.038	0.028
Tenure	0.004***	0.001	0.003*	0.001	0.004***	0.001
Potential Experience	0.026***	0.003	0.034***	0.005	0.027***	0.002
(Potential Experience)^2/100	-0.047***	0.006	-0.073***	0.010	-0.051***	0.005
Native	-0.127***	0.045			-0.134***	0.042
Speaks Only or Mostly Lang. of Origin	-0.051	0.066			-0.041	0.061
Speaks Both Languages Equal Frequently	-0.119**	0.047			-0.115***	0.044
Speaks Mostly German	-0.084*	0.044			-0.085**	0.040
Mining	-0.033	0.083	-0.280*	0.152	-0.104	0.072
Manufacturing	-0.057	0.053	-0.268***	0.083	-0.103**	0.045
Construction	-0.026	0.055	-0.241***	0.083	-0.072	0.046
Trade	-0.206***	0.055	-0.382***	0.086	-0.243***	0.047
Transportation	-0.157***	0.058	-0.288***	0.088	-0.184***	0.049
Banking and Insurance	-0.041	0.059	-0.397***	0.096	-0.101**	0.050
Service	-0.120**	0.054	-0.222***	0.082	-0.142***	0.045
Between 20 and 200	0.133***	0.020	0.181***	0.027	0.148***	0.016
Between 200 and 2000	0.175***	0.021	0.302***	0.032	0.208***	0.017
More than 2000	0.208***	0.021	0.359***	0.036	0.245***	0.018
Doesn't Work in Occupation Trained For	-0.081***	0.015	-0.073***	0.023	-0.081***	0.012
No Training	-0.187***	0.029	-0.060	0.073	-0.180***	0.026
White Collar	0.045*	0.027	0.109***	0.042	0.055**	0.022
Civil Service	0.181***	0.031	0.146**	0.057	0.172***	0.027
Qualified and Highly Qual. Professional	0.292***	0.020	0.279***	0.032	0.289***	0.017
Forman	0.118***	0.031	0.115**	0.049	0.126***	0.026
Managerial	0.634***	0.045	0.373***	0.082	0.594***	0.040
Region					0.285***	0.015
Participation Equation						
Constant	1.909***	0.485	2.459***	0.865	1.998***	0.417
Age	-0.033	0.023	-0.068	0.042	-0.041**	0.020
Age^2/100	0.050*	0.027	0.084*	0.050	0.058**	0.023
Gender	-0.028	0.067	0.064	0.110	-0.025	0.056
Number of Children	0.089**	0.043	0.124	0.089	0.103***	0.038
Number of Adults	-0.091***	0.033			-0.082***	0.029
Education	0.011	0.011	0.023	0.022	0.018*	0.009
Single	-0.175**	0.077	-0.164	0.149	-0.184***	0.068
Divorced, Widowed or Separated	-0.321***	0.086	-0.540***	0.147	-0.331***	0.074
ρ	-0.928	0.013	-0.880	0.029	-0.916	0.011
σ	0.382	0.006	0.370	0.009	0.384	0.005
λ	-0.355	0.008	-0.326	0.016	-0.352	0.007

a. Source: Author

b. ***, **, * indicate that the coefficient is statistically significant at 1%, 5% and 10% respectively.

Table 14: Log–Wage and Participation Equations for 2002

Log - Wage Equation						
Region	West		East		Both	
Number of Observations	4618		1511		6129	
Censored Observations	349		98		447	
Likelihood Ratio Test ($\rho = 0$): (Prob > $\chi 2$)	0.000		0.000		0.000	
Log Likelihood	-3112.125		-1000.867		-4183.005	
Variable	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Constant	2.005***	0.071	1.984***	0.095	1.778***	0.062
Gender	0.190***	0.014	0.118***	0.025	0.177***	0.012
Elementary School	-0.250***	0.055	-0.023	0.342	-0.231***	0.052
Secondary School 1	-0.122***	0.031	-0.256***	0.097	-0.113***	0.029
Secondary School 2	-0.210***	0.016	-0.186***	0.030	-0.203***	0.014
High - School	-0.162***	0.033	-0.110***	0.038	-0.152***	0.025
Tenure	0.006***	0.001	0.003**	0.001	0.006***	0.001
Potential Experience	0.044***	0.002	0.029***	0.005	0.041***	0.002
(Potential Experience)^2/100	-0.080***	0.005	-0.061***	0.009	-0.076***	0.004
Native	-0.043	0.031			-0.042	0.030
Speaks Only or Mostly Lang. of Origin	0.099	0.064			0.113*	0.062
Speaks Both Languages Equal Frequently	-0.030	0.044			-0.026	0.042
Speaks Mostly German	-0.017	0.038			-0.010	0.037
Mining	-0.148	0.105	0.136	0.161	-0.076	0.089
Manufacturing	-0.098*	0.057	-0.207***	0.075	-0.114**	0.047
Construction	-0.094	0.058	-0.245***	0.077	-0.116**	0.047
Trade	-0.200***	0.059	-0.323***	0.078	-0.212***	0.048
Transportation	-0.248***	0.061	-0.231***	0.082	-0.241***	0.050
Banking and Insurance	-0.087	0.061	-0.096	0.100	-0.093*	0.050
Service	-0.194***	0.057	-0.178**	0.075	-0.186***	0.047
Between 20 and 200	0.138***	0.017	0.187***	0.026	0.152***	0.015
Between 200 and 2000	0.183***	0.018	0.346***	0.031	0.217***	0.016
More than 2000	0.204***	0.019	0.415***	0.034	0.242***	0.016
Doesn't Work in Occupation Trained For	-0.059***	0.014	-0.072***	0.022	-0.061***	0.012
No Training	-0.365***	0.027	-0.510***	0.063	-0.377***	0.024
White Collar	0.074***	0.024	0.006	0.039	0.069***	0.021
Civil Service	0.170***	0.027	0.204***	0.054	0.171***	0.024
Qualified and Highly Qual. Professional	0.297***	0.017	0.184***	0.031	0.285***	0.015
Forman	0.103***	0.031	0.050	0.052	0.102***	0.027
Managerial	0.485***	0.040	0.644***	0.093	0.508***	0.036
Region					0.258***	0.013
Participation Equation						
Constant	2.223***	0.401	2.459***	0.865	1.956***	0.344
Age	-0.055***	0.019	-0.057*	0.034	-0.048***	0.016
Age^2/100	0.071***	0.022	0.093**	0.043	0.065***	0.019
Gender	0.009	0.056	0.194**	0.091	0.039	0.047
Number of Children	0.066**	0.032	0.038	0.060	0.060**	0.028
Number of Adults	-0.074***	0.027			-0.056**	0.024
Education	0.012	0.009	0.040**	0.019	0.016**	0.008
Single	0.104	0.072	0.078	0.127	0.096	0.063
Divorced, Widowed or Separated	-0.171**	0.075	0.302*	0.176	-0.114*	0.067
ρ	-0.859	0.014	-0.858	0.034	-0.859	0.013
σ	0.415	0.005	0.412	0.009	0.419	0.004
λ	-0.357	0.009	-0.354	0.019	-0.360	0.008

a. Source: Author

b. ***, **, * indicate that the coefficient is statistically significant at 1%, 5% and 10% respectively.

Table 15: Log-Wage and Participation Equations for 2006

Log - Wage Equation						
Region	West		East		Both	
Number of Observations	3433		1122		4555	
Censored Observations	268		71		339	
Likelihood Ratio Test ($\rho = 0$): (Prob > $\chi 2$)	0.000		0.000		0.000	
Log Likelihood	-2158.857		-608.587		-2855.961	
Variable	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Constant	2.194***	0.083	1.783***	0.102	1.920***	0.071
Gender	0.219***	0.016	0.192***	0.026	0.214***	0.014
Elementary School	-0.511***	0.061	-0.043	0.303	-0.500***	0.058
Secondary School 1	-0.317***	0.035	-0.818***	0.090	-0.337***	0.032
Secondary School 2	-0.243***	0.017	-0.288***	0.032	-0.248***	0.015
High - School	-0.245***	0.037	-0.117***	0.040	-0.200***	0.028
Tenure	0.006***	0.001	0.005***	0.002	0.007***	0.001
Potential Experience	0.032***	0.003	0.040***	0.005	0.033***	0.002
(Potential Experience)^2/100	-0.053***	0.005	-0.072***	0.010	-0.056***	0.005
Native	-0.105***	0.039			-0.113***	0.038
Speaks Only or Mostly Lang. of Origin	0.032	0.076			0.022	0.073
Speaks Both Languages Equal Frequently	-0.106**	0.051			-0.112**	0.049
Speaks Mostly German	-0.034	0.030			-0.035	0.028
Mining	-0.205*	0.112	-0.151	0.162	-0.193**	0.094
Manufacturing	-0.135**	0.065	-0.218***	0.082	-0.147***	0.052
Construction	-0.119*	0.066	-0.196**	0.083	-0.134**	0.053
Trade	-0.317***	0.066	-0.318***	0.086	-0.317***	0.054
Transportation	-0.320***	0.069	-0.327***	0.087	-0.319***	0.056
Banking and Insurance	-0.166**	0.069	-0.243**	0.111	-0.185***	0.057
Service	-0.206***	0.065	-0.261***	0.080	-0.219***	0.052
Between 20 and 200	0.092***	0.019	0.276***	0.028	0.137***	0.016
Between 200 and 2000	0.185***	0.020	0.363***	0.033	0.225***	0.017
More than 2000	0.234***	0.020	0.431***	0.036	0.275***	0.017
Doesn't Work in Occupation Trained For	-0.050***	0.015	-0.155***	0.025	-0.069***	0.013
No Training	-0.231***	0.026	-0.368***	0.051	-0.254***	0.023
White Collar	0.084***	0.025	0.161***	0.045	0.108***	0.022
Civil Service	0.135***	0.030	0.238***	0.055	0.147***	0.026
Qualified and Highly Qual. Professional	0.318***	0.019	0.217***	0.033	0.307***	0.016
Forman	0.207***	0.032	0.087*	0.052	0.185***	0.027
Managerial	0.399***	0.046	0.552***	0.082	0.447***	0.040
Region					0.261***	0.015
Participation Equation						
Constant	1.634***	0.433	3.451***	0.942	1.897***	0.387
Age	-0.031	0.020	-0.145***	0.044	-0.047***	0.018
Age^2/100	0.042*	0.023	0.176***	0.054	0.062***	0.021
Gender	-0.046	0.061	0.100	0.118	-0.031	0.053
Number of Children	0.106***	0.034	0.193**	0.090	0.103***	0.031
Number of Adults	-0.055*	0.031			-0.053*	0.028
Education	0.019**	0.010	0.063**	0.026	0.026**	0.009
Single	0.062	0.074	-0.255	0.165	0.020	0.067
Divorced, Widowed or Separated	-0.092	0.094	0.061	0.169	-0.044	0.082
P	-0.914	0.014	-0.830	0.047	-0.905	0.013
Σ	0.401	0.006	0.369	0.009	0.401	0.005
Λ	-0.367	0.009	-0.306	0.022	-0.363	0.008

a. Source: Author

b. ***, **, * indicate that the coefficient is statistically significant at 1%, 5% and 10% respectively.

APPENDIX C:

Decomposition Results Using Auxiliary Equation (10):

Table 16: Decomposition of Wage Inequality in the Western Region during 1999 – 2002

Δ VLOG = 0.066							
	Fields (2003)			Yun (2006)			
Variable	s_{k99}	s_{k02}	$\pi(\sigma^2)$	**Char. Eff.**	**%**	**Coeff. Eff.**	**%**
Gender	**0.064**	**0.038**	**-0.041**	**0.002**	**3.648**	**-0.005**	**-7.778**
Elementary School	0.006	0.004	-0.003	-0.001	-1.149	0.001	0.860
Secondary School 1	0.020	0.009	-0.023	0.002	2.276	-0.003	-4.559
Secondary School 2	0.029	0.031	0.040	0.002	3.670	0.000	0.294
High - School	-0.001	0.004	0.017	0.000	0.161	0.001	1.553
Education	**0.054**	**0.048**	**0.031**	**0.003**	**4.959**	**-0.001**	**-1.851**
Tenure	**0.023**	**0.038**	**0.086**	**0.001**	**1.054**	**0.005**	**7.572**
Potential Experience	0.102	0.242	0.671	0.009	13.785	0.035	53.322
(Potential Experience)^2/100	-0.066	-0.140	-0.365	-0.004	-6.709	-0.020	-29.805
Potential Experience	**0.036**	**0.103**	**0.306**	**0.005**	**7.076**	**0.016**	**23.516**
Native	**-0.004**	**-0.002**	**0.006**	**0.000**	**-0.714**	**0.001**	**1.342**
Speaks Only or Mostly Lang. of Origin	0.001	-0.001	-0.005	0.000	-0.106	0.000	-0.401
Speaks Both Languages Equal Frequently	0.005	0.001	-0.013	0.000	-0.606	0.000	-0.650
Speaks Mostly German	0.001	0.000	-0.003	0.000	0.438	0.000	-0.719
Language Proficiency	**0.007**	**0.000**	**-0.020**	**0.000**	**-0.274**	**-0.001**	**-1.770**
Mining	0.000	0.000	-0.001	0.000	-0.012	0.000	-0.107
Manufacturing	-0.001	-0.001	-0.001	0.000	-0.058	0.000	-0.031
Construction	-0.001	-0.001	-0.001	0.000	0.379	0.000	-0.479
Trade	0.037	0.018	-0.042	-0.001	-1.429	-0.002	-2.770
Transportation	0.002	0.004	0.009	0.000	-0.690	0.001	1.562
Banking and Insurance	-0.002	-0.004	-0.012	0.000	-0.173	-0.001	-0.991
Service	-0.008	-0.004	0.007	0.000	0.409	0.000	0.262
Industry	**0.027**	**0.010**	**-0.041**	**-0.001**	**-1.574**	**-0.002**	**-2.554**
Between 20 and 200	-0.006	-0.005	-0.002	-0.001	-0.884	0.000	0.648
Between 200 and 2000	0.004	0.012	0.037	0.001	2.164	0.001	1.491
More than 2000	0.044	0.033	0.002	0.002	2.490	-0.002	-2.340
Company Size	**0.042**	**0.040**	**0.036**	**0.002**	**3.771**	**0.000**	**-0.200**
Doesn't Work in Occupation Trained For	0.007	0.002	-0.014	0.001	0.866	-0.002	-2.303
No Training	0.025	0.072	0.216	0.002	3.117	0.012	18.451
Occupation/Training	**0.032**	**0.074**	**0.201**	**0.003**	**3.984**	**0.011**	**16.148**
White Collar	-0.007	-0.006	-0.006	0.000	0.019	0.000	-0.586
Civil Service	0.018	0.011	-0.010	0.000	-0.207	0.000	-0.747
Qualified and Highly Qual. Professional	0.082	0.082	0.085	0.001	0.842	0.005	7.665
Forman	0.002	0.001	-0.003	0.000	-0.225	0.000	-0.052
Managerial	0.028	0.019	-0.009	0.007	10.563	-0.008	-11.450
Occupational Position	**0.123**	**0.107**	**0.058**	**0.007**	**10.992**	**-0.003**	**-5.170**
Residual			**0.378**				
Total			**1.000**	**0.022**	**32.920**	**0.019**	**29.255**
					Residual	**0.025**	**37.824**

Source: Author

Table 17: Decomposition of Wage Inequality in the Eastern Region during 1999 – 2002

Δ VLOG = 0.073							
	Fields (2003)			**Yun (2006)**			
Variable	s_{k99}	s_{k02}	$\pi(\sigma^2)$	**Char. Eff.**	**%**	**Coeff. Eff.**	**%**
Gender	**-0.003**	**0.008**	**0.036**	**0.002**	**3.182**	**0.000**	**0.376**
Elementary School	0.007	0.000	-0.017	-0.001	-1.413	0.000	-0.304
Secondary School 1	0.016	0.007	-0.015	0.000	-0.329	-0.001	-1.156
Secondary School 2	0.037	0.054	0.097	0.002	3.391	0.005	6.290
High - School	-0.007	-0.003	0.008	0.001	1.099	0.000	-0.303
Education	**0.053**	**0.058**	**0.073**	**0.002**	**2.747**	**0.003**	**4.527**
Tenure	**0.009**	**0.013**	**0.022**	**0.001**	**1.000**	**0.001**	**1.233**
Potential Experience	0.039	0.101	0.262	0.021	28.409	-0.002	-2.216
(Potential Experience)^2/100	0.003	-0.059	-0.222	-0.015	-21.146	-0.001	-1.103
Potential Experience	**0.042**	**0.041**	**0.039**	**0.005**	**7.263**	**-0.002**	**-3.319**
Mining	0.001	0.001	0.001	0.000	-0.237	0.000	0.350
Manufacturing	0.015	0.008	-0.011	0.002	2.225	-0.002	-3.298
Construction	0.015	0.019	0.030	0.000	-0.509	0.003	3.492
Trade	0.066	0.050	0.008	0.003	4.657	-0.003	-3.889
Transportation	-0.008	-0.002	0.014	0.001	1.211	0.000	0.208
Banking and Insurance	-0.001	-0.003	-0.006	-0.001	-1.073	0.000	0.457
Service	-0.050	-0.035	0.003	-0.003	-4.635	0.004	4.916
Industry	**0.038**	**0.038**	**0.039**	**0.001**	**1.639**	**0.002**	**2.236**
Between 20 and 200	-0.004	-0.009	-0.024	0.000	-0.685	-0.001	-1.673
Between 200 and 2000	0.047	0.062	0.102	0.001	1.263	0.006	8.939
More than 2000	0.068	0.064	0.054	0.000	0.466	0.004	4.895
Company Size	**0.112**	**0.117**	**0.132**	**0.001**	**1.044**	**0.009**	**12.161**
Doesn't Work in Occupation Trained For	0.011	0.001	-0.024	-0.001	-1.988	0.000	-0.458
No Training	0.002	0.072	0.253	0.001	1.608	0.017	23.670
Occupation/Training	**0.013**	**0.073**	**0.228**	**0.000**	**-0.380**	**0.017**	**23.213**
White Collar	-0.009	-0.001	0.022	0.000	-0.297	0.002	2.497
Civil Service	0.005	0.013	0.033	0.001	0.917	0.002	2.422
Qualified and Highly Qual. Professional	0.103	0.056	-0.067	0.005	6.945	-0.010	-13.626
Forman	0.003	0.000	-0.007	0.000	-0.433	0.000	-0.247
Managerial	0.006	0.023	0.066	0.001	1.856	0.003	4.729
Occupational Position	**0.108**	**0.092**	**0.048**	**0.007**	**8.988**	**-0.003**	**-4.226**
Residual			**0.383**				
Total			**1.000**	**0.018**	**25.484**	**0.026**	**36.201**
					Residual	**0.028**	**38.315**

Source: Author

Table 18: Decomposition of Wage Inequality in Reunified Germany during 1999 – 2002

Δ VLOG = 0.064							
	Fields (2003)			Yun (2006)			
Variable	s_{k99}	s_{k02}	$\pi(\sigma^2)$	**Char. Eff.**	**%**	**Coeff. Eff.**	**%**
Gender	**0.047**	**0.032**	**-0.019**	**0.002**	**3.804**	**-0.004**	**-5.662**
Elementary School	0.005	0.002	-0.005	-0.001	-1.073	0.000	0.580
Secondary School 1	0.013	0.006	-0.017	0.001	1.701	-0.002	-3.447
Secondary School 2	0.029	0.034	0.052	0.003	4.499	0.000	0.668
High - School	0.000	0.004	0.019	0.000	0.230	0.001	1.673
Education	**0.046**	**0.047**	**0.048**	**0.003**	**5.357**	**0.000**	**-0.526**
Tenure	**0.024**	**0.036**	**0.079**	**0.001**	**1.333**	**0.004**	**6.562**
Potential Experience	0.089	0.196	0.562	0.010	15.248	0.026	40.959
(Potential Experience)^2/100	-0.059	-0.114	-0.304	-0.005	-7.602	-0.014	-22.768
Potential Experience	**0.030**	**0.081**	**0.258**	**0.005**	**7.646**	**0.012**	**18.191**
Native	**0.000**	**-0.001**	**-0.003**	**0.000**	**-0.418**	**0.000**	**0.167**
Speaks Only or Mostly Lang. of Origin	0.000	0.000	-0.003	0.000	-0.061	0.000	-0.213
Speaks Both Languages Equal Frequently	0.002	0.000	-0.007	0.000	-0.454	0.000	-0.209
Speaks Mostly German	0.000	0.000	0.001	0.000	0.399	0.000	-0.333
Language Proficiency	**0.002**	**0.000**	**-0.009**	**0.000**	**-0.116**	**0.000**	**-0.755**
Mining	0.000	0.000	0.000	0.000	-0.016	0.000	0.009
Manufacturing	-0.001	-0.001	0.001	0.000	0.078	0.000	0.048
Construction	-0.002	0.000	0.008	0.001	0.815	0.000	-0.015
Trade	0.038	0.020	-0.044	0.000	0.702	-0.003	-5.100
Transportation	0.002	0.003	0.006	0.000	-0.787	0.001	1.388
Banking and Insurance	-0.004	-0.004	-0.007	0.000	-0.574	0.000	-0.158
Service	-0.010	-0.007	0.002	0.000	-0.590	0.000	0.760
Industry	**0.023**	**0.010**	**-0.034**	**0.000**	**-0.372**	**-0.002**	**-3.066**
Between 20 and 200	-0.009	-0.007	-0.003	-0.001	-1.009	0.000	0.735
Between 200 and 2000	0.012	0.019	0.044	0.002	2.660	0.001	1.713
More than 2000	0.054	0.041	-0.001	0.002	2.781	-0.002	-2.887
Company Size	**0.057**	**0.053**	**0.040**	**0.003**	**4.432**	**0.000**	**-0.438**
Doesn't Work in Occupation Trained For	0.009	0.002	-0.019	0.000	0.253	-0.001	-2.118
No Training	0.017	0.065	0.228	0.002	3.847	0.012	18.945
Occupation/Training	**0.026**	**0.067**	**0.209**	**0.003**	**4.100**	**0.011**	**16.826**
White Collar	-0.007	-0.006	-0.002	0.000	-0.090	0.000	-0.078
Civil Service	0.016	0.012	-0.003	0.000	0.441	0.000	-0.692
Qualified and Highly Qual. Professional	0.078	0.076	0.070	0.001	2.223	0.003	4.807
Forman	0.002	0.000	-0.005	0.000	-0.422	0.000	-0.031
Managerial	0.022	0.019	0.008	0.006	9.115	-0.005	-8.266
Occupational Position	**0.111**	**0.102**	**0.070**	**0.007**	**11.266**	**-0.003**	**-4.260**
Region	**0.069**	**0.043**	**-0.049**	**0.001**	**2.251**	**-0.005**	**-7.133**
Residual			**0.408**				
Total			**1.000**	**0.025**	**39.284**	**0.013**	**19.906**
					Residual	**0.026**	**40.810**

Source: Author

Table 19: Decomposition of Wage Inequality in the Western Region during 2002 – 2006

Δ VLOG = -0.008							
	Fields (2003)			Yun (2006)			
Variable	s_{k02}	s_{k06}	$\pi(\sigma^2)$	**Char. Eff.**	**%**	**Coeff. Eff.**	**%**
Gender	**0.038**	**0.056**	**-0.528**	**0.001**	**-17.956**	**0.003**	**-34.846**
Elementary School	0.004	0.012	-0.244	0.000	4.466	0.002	-28.853
Secondary School 1	0.009	0.022	-0.397	-0.001	9.814	0.004	-49.518
Secondary School 2	0.031	0.047	-0.466	0.004	-52.198	0.000	5.561
High - School	0.004	0.003	0.039	-0.001	8.132	0.000	-4.257
Education	**0.048**	**0.083**	**-1.069**	**0.002**	**-29.786**	**0.006**	**-77.066**
Tenure	**0.038**	**0.040**	**-0.014**	**0.001**	**-6.198**	**0.000**	**4.822**
Potential Experience	0.242	0.173	2.450	0.007	-86.819	-0.027	331.862
(Potential Experience)^2/100	-0.140	-0.100	-1.404	-0.006	72.850	0.017	-213.28
Potential Experience	**0.103**	**0.073**	**1.046**	**0.001**	**-13.969**	**-0.010**	**118.583**
Native	**-0.002**	**-0.003**	**0.038**	**0.000**	**-0.352**	**0.000**	**4.114**
Speaks Only or Mostly Lang. of Origin	-0.001	0.000	-0.020	0.000	-1.086	0.000	-0.905
Speaks Both Languages Equal Frequently	0.001	0.002	-0.059	0.000	0.627	0.001	-6.534
Speaks Mostly German	0.000	0.001	-0.036	0.000	-1.848	0.000	-1.736
Language Proficiency	**0.000**	**0.004**	**-0.115**	**0.000**	**-2.308**	**0.001**	**-9.175**
Mining	0.000	0.000	-0.007	0.000	-1.333	0.000	0.626
Manufacturing	-0.001	-0.006	0.157	-0.001	8.267	-0.001	7.477
Construction	-0.001	-0.003	0.054	0.000	3.066	0.000	2.332
Trade	0.018	0.045	-0.865	0.001	-15.158	0.006	-71.380
Transportation	0.004	0.002	0.059	-0.001	7.965	0.000	-2.032
Banking and Insurance	-0.004	-0.009	0.145	0.000	0.906	-0.001	13.548
Service	-0.004	-0.003	-0.039	0.002	-21.922	-0.001	17.987
Industry	**0.010**	**0.026**	**-0.497**	**0.001**	**-18.210**	**0.003**	**-31.441**
Between 20 and 200	-0.005	-0.007	0.062	0.001	-11.563	-0.001	17.725
Between 200 and 2000	0.012	0.021	-0.273	0.001	-9.335	0.001	-18.014
More than 2000	0.033	0.041	-0.224	-0.001	13.166	0.003	-35.601
Company Size	**0.040**	**0.055**	**-0.436**	**0.001**	**-7.732**	**0.003**	**-35.890**
Doesn't Work in Occupation Trained For	0.002	0.002	0.006	0.000	-3.025	0.000	3.651
No Training	0.072	0.045	0.947	0.000	-1.442	-0.008	96.115
Occupation/Training	**0.074**	**0.047**	**0.953**	**0.000**	**-4.467**	**-0.008**	**99.766**
White Collar	-0.006	-0.010	0.101	0.000	4.789	0.000	5.343
Civil Service	0.011	0.008	0.107	0.000	-6.109	-0.001	16.833
Qualified and Highly Qual. Professional	0.082	0.099	-0.438	-0.003	40.198	0.007	-83.995
Forman	0.001	0.005	-0.136	0.000	5.644	0.002	-19.254
Managerial	0.019	0.007	0.401	0.002	-28.806	-0.006	68.940
Occupational Position	**0.107**	**0.109**	**0.036**	**-0.001**	**15.716**	**0.001**	**-12.133**
Residual			**1.585**				
Total			**1.000**	**0.007**	**-85.263**	**-0.002**	**26.734**
					Residual	**-0.013**	**158.529**

Source: Author

Table 20: Decomposition of Wage Inequality in the Eastern Region during 2002 – 2006

Δ VLOG = 0.019							
	Fields (2003)			Yun (2006)			
Variable	s_{k02}	s_{k06}	$\pi(\sigma^2)$	**Char. Eff.**	**%**	**Coeff. Eff.**	**%**
Gender	**0.008**	**0.018**	**0.158**	**-0.001**	**-7.282**	**0.004**	**23.083**
Elementary School	0.000	0.000	0.001	0.000	0.015	0.000	0.041
Secondary School 1	0.007	0.043	0.542	-0.001	-4.161	0.011	58.319
Secondary School 2	0.054	0.088	0.567	0.001	4.230	0.010	52.461
High - School	-0.003	-0.004	-0.023	0.000	1.977	-0.001	-4.314
Education	**0.058**	**0.127**	**1.086**	**0.000**	**2.061**	**0.020**	**106.507**
Tenure	**0.013**	**0.031**	**0.285**	**0.000**	**-1.694**	**0.006**	**30.208**
Potential Experience	0.101	0.193	1.485	-0.006	-31.382	0.034	179.920
(Potential Experience)^2/100	-0.059	-0.120	-0.973	0.007	36.038	-0.025	-133.31
Potential Experience	**0.041**	**0.073**	**0.513**	**0.001**	**4.657**	**0.009**	**46.614**
Mining	0.001	0.000	-0.016	0.000	0.617	0.000	-2.193
Manufacturing	0.008	0.005	-0.035	0.001	5.043	-0.002	-8.521
Construction	0.019	0.000	-0.269	0.000	-1.950	-0.005	-24.951
Trade	0.050	0.023	-0.353	-0.004	-22.042	-0.002	-13.241
Transportation	-0.002	0.005	0.095	-0.001	-3.909	0.003	13.398
Banking and Insurance	-0.003	-0.005	-0.041	0.000	-1.091	-0.001	-2.990
Service	-0.035	-0.012	0.315	0.002	12.273	0.004	19.263
Industry	**0.038**	**0.015**	**-0.303**	**-0.002**	**-11.059**	**-0.004**	**-19.235**
Between 20 and 200	-0.009	0.013	0.322	-0.003	-14.264	0.009	46.477
Between 200 and 2000	0.062	0.048	-0.150	-0.003	-18.291	0.001	3.340
More than 2000	0.064	0.067	0.102	0.003	17.463	-0.001	-7.263
Company Size	**0.117**	**0.128**	**0.275**	**-0.003**	**-15.092**	**0.008**	**42.554**
Doesn't Work in Occupation Trained For	0.001	0.012	0.168	0.000	-2.070	0.004	18.833
No Training	0.072	0.061	-0.097	0.005	25.673	-0.007	-35.340
Occupation/Training	**0.073**	**0.073**	**0.071**	**0.004**	**23.603**	**-0.003**	**-16.507**
White Collar	-0.001	-0.007	-0.100	0.000	0.110	-0.002	-10.090
Civil Service	0.013	0.018	0.082	0.000	1.697	0.001	6.463
Qualified and Highly Qual. Professional	0.056	0.064	0.168	-0.001	-4.988	0.004	21.753
Forman	0.000	0.000	0.004	0.000	-0.727	0.000	1.142
Managerial	0.023	0.023	0.023	0.002	10.526	-0.002	-8.246
Occupational Position	**0.092**	**0.097**	**0.176**	**0.001**	**6.618**	**0.002**	**11.022**
Residual			**-1.261**				
Total			**1.000**	**0.000**	**1.811**	**0.042**	**224.246**
					Residual	**-0.024**	**-126.06**

Source: Author

Table 21: decomposition of Wage Inequality in Reunified Germany during 2002 – 2006

Δ VLOG = -0.002							
	Fields (2003)			Yun (2006)			
Variable	s_{k02}	s_{k06}	$\pi(\sigma^2)$	**Char. Eff.**	**%**	**Coeff. Eff.**	**%**
Gender	**0.032**	**0.047**	**-2.512**	**0.000**	**-19.555**	**0.004**	**-231.65**
Elementary School	0.002	0.008	-0.920	0.000	17.122	0.002	-109.11
Secondary School 1	0.006	0.019	-2.107	-0.001	37.955	0.004	-248.70
Secondary School 2	0.034	0.050	-2.578	0.004	-220.73	0.001	-37.05
High - School	0.004	0.003	0.172	-0.001	32.243	0.000	-15.089
Education	**0.047**	**0.080**	**-5.434**	**0.002**	**-133.41**	**0.007**	**-409.95**
Tenure	**0.036**	**0.040**	**-0.510**	**0.000**	**-11.661**	**0.001**	**-39.325**
Potential Experience	0.196	0.166	5.066	0.005	-271.61	-0.013	778.176
$(\text{Potential Experience})^2/100$	-0.114	-0.099	-2.618	-0.003	199.593	0.008	-461.42
Potential Experience	**0.081**	**0.067**	**2.447**	**0.001**	**-72.013**	**-0.005**	**316.759**
Native	**-0.001**	**-0.001**	**0.054**	**0.000**	**-3.204**	**0.000**	**8.628**
Speaks Only or Mostly Lang. of Origin	0.000	0.000	-0.064	0.000	-6.302	0.000	-0.124
Speaks Both Languages Equal Frequently	0.000	0.001	-0.197	0.000	2.611	0.000	-22.276
Speaks Mostly German	0.000	0.001	-0.092	0.000	-2.110	0.000	-7.111
Language Proficiency	**0.000**	**0.002**	**-0.353**	**0.000**	**-5.800**	**0.001**	**-29.510**
Mining	0.000	0.000	-0.017	0.000	-1.494	0.000	-0.171
Manufacturing	-0.001	-0.006	0.889	-0.001	31.226	-0.001	57.705
Construction	0.000	-0.003	0.473	0.000	17.657	-0.001	29.649
Trade	0.020	0.036	-2.624	0.000	-27.696	0.004	-234.73
Transportation	0.003	0.003	0.024	-0.001	37.972	0.001	-35.586
Banking and Insurance	-0.004	-0.009	0.811	0.000	6.853	-0.001	74.257
Service	-0.007	0.001	-1.399	0.002	-120.51	0.000	-19.380
Industry	**0.010**	**0.022**	**-1.842**	**0.001**	**-55.994**	**0.002**	**-128.26**
Between 20 and 200	-0.007	-0.009	0.222	0.000	-23.312	-0.001	45.494
Between 200 and 2000	0.019	0.027	-1.361	0.001	-50.181	0.001	-85.894
More than 2000	0.041	0.049	-1.209	-0.001	59.744	0.003	-180.64
Company Size	**0.053**	**0.067**	**-2.348**	**0.000**	**-13.749**	**0.004**	**-221.04**
Doesn't Work in Occupation Trained For	0.002	0.003	-0.141	0.000	-4.562	0.000	-9.549
No Training	0.065	0.045	3.355	0.001	-35.835	-0.006	371.315
Occupation/Training	**0.067**	**0.048**	**3.214**	**0.001**	**-40.398**	**-0.006**	**361.766**
White Collar	-0.006	-0.010	0.714	0.000	13.530	-0.001	57.902
Civil Service	0.012	0.010	0.415	0.000	-27.717	-0.001	69.178
Qualified and Highly Qual. Professional	0.076	0.091	-2.444	-0.002	129.758	0.006	-374.14
Forman	0.000	0.003	-0.476	0.000	19.633	0.001	-67.280
Managerial	0.019	0.009	1.685	0.002	-121.01	-0.005	289.52
Occupational Position	**0.102**	**0.103**	**-0.106**	**0.000**	**14.194**	**0.000**	**-24.818**
Region	**0.043**	**0.045**	**-0.379**	**0.001**	**-41.326**	**0.000**	**3.391**
Residual			**8.769**				
Total			**1.000**	**0.007**	**-382.92**	**0.007**	**-394.00**
					Residual	**-0.015**	**876.924**

Source: Author